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# NEW ELEMENTS OF OPERATIVE SURGERY:

BY

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CAREFULLY REVISED, ENTIRELY REMODELLED, AND AUGMENTED WITH  
A TREATISE ON MINOR SURGERY.

ILLUSTRATED BY

OVER 200 ENGRAVINGS, INCORPORATED WITH THE TEXT:

ACCOMPANIED WITH  
AN ATLAS IN QUARTO OF TWENTY-TWO PLATES,  
REPRESENTING THE PRINCIPAL OPERATIVE PROCESSES, SURGICAL INSTRUMENTS, &c.

FIRST AMERICAN, FROM THE LAST PARIS EDITION.

TRANSLATED BY

P. S. TOWNSEND, M. D.

Late Physician to the Seamen's Retreat, Staten Island, New York.

AUGMENTED BY THE ADDITION OF

SEVERAL HUNDRED PAGES OF ENTIRELY NEW MATTER,  
COMPRISING ALL THE LATEST IMPROVEMENTS AND DISCOVERIES IN SURGERY,  
IN AMERICA AND EUROPE, UP TO THE PRESENT TIME.

UNDER THE SUPERVISION OF, AND WITH NOTES AND OBSERVATIONS BY

VALENTINE MOTT, M. D.

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of that of Berlin, Brussels, Athens, &c.

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## P R E F A C E

TO THE THIRD AND LAST VOLUME OF THIS WORK.

BY P. S. TOWNSEND, M.D.

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If it were possible that any portion of these volumes could be considered more valuable to students and to practitioners than the rest, we should say, apart from the great capital operations on aneurisms, amputations, exsections, &c., in the 2d volume, and the rudimental subjects of minor surgery and the new operations embraced in the 1st volume,—that the *special* operations on all the varied regions of the human body, contained in this 3d and last volume, especially in relation to the important subjects of Hernia and Tumors, and those most difficult manipulations exacted in the minute and delicate surgery of the face, neck, and all the different vital organs and passages considered separately, together with the accompanying beautiful quarto atlas of nearly 200 figures of surgical instruments and processes, would unquestionably bear the palm of precedence for direct practical utility.

The whole, as will be perceived, have been treated of with the habitual felicitous manner of M. Velpeau, both in regard to the perspicuity of the style of the author, and his intimate practical familiarity with the operations themselves. But for having been already somewhat accustomed, however, to his manner of describing surgical processes, we should have despaired of rendering some of the more intricate of these operations intelligible in our own language.

We trust we have succeeded, at least we count with some degree of security on not having committed in any place, any sensible deviation from the path traced out for us, while endeavoring to adhere as closely as possible to the meaning of the original, and at the same time to convey the ideas of the author into our own idiom, in a manner, we hope, not entirely wanting either in spirit or perspicuity.

We are gratified in being enabled to state from a recent letter of M. Velpeau, that the work, so far as it had progressed, had met with his entire approbation; so much so, that he hesitates to our enquiry of his intention to publish a second French edition, by saying that he should meditate upon this present work, in order to satisfy himself first, that the necessity of such a task had not been fully anticipated by our labors.

The text of this present volume, we may furthermore remark, is so ample and searching in its details, and so perfectly *au courant* to the present condition of surgery, in respect to the subject-matters therein embraced, that any attempt almost on our part, to superadd any thing new to what M. Velpeau himself has said, has been almost entirely superseded. Nevertheless, it will be perceived that we have deemed it advisable to incorporate some 100 pages of new matter in various places, among which the animated discussion still in progress, on the diagnosis of *Fibrous and Cancerous Tumors*, and the important, though brief remarks of Dr. Mott on his eminently successful mode of treating the distressing affection of *Immobility of the Lower Jaw*, will, we are sure, be found of some interest to the profession.

While touching on this matter, we may remark, that in a case of this kind, and as an auxiliary to the screw-lever of Dr. Mott, the right *masseter* muscle was **TOTALLY** divided, and the *left* partially so, as early as the year 1840, by James R. Wood, M. D. of this city. Complete success, however, did not reward the bold expedient of this skilful young surgeon, which, however, might possibly have been obtained if it had occurred to him to have adopted the ingenious resource of his preceptor, Dr. Mott, by severing also the *pterygoid* muscles.

We are somewhat strengthened in this opinion by what happened in the case of M. DIEULAFOY, of Toulouse, who also after all the discussion which has occupied our pages, (see Vols. I. and II., Drs. Schmidt and Carnochan,) on the claims of priority for the *total* division of the masseter, appears to have been the *first* surgeon, who *first* actually achieved this triumph, as well as a complete cure in the case in question, but *not* until after the subsequent partial division of the *pterygoid* muscles.

M. Dieulafoy, according to the *Journal de Méd. et de Chirurg. Prat.*, of August, 1839, divided the year before (1838) by puncture in the cheek externally, and then by the subcutaneous method the entire *right masseter* in a soldier aged 29, at the Hotel Dieu, Saint Jacques (Toulouse,) in whom the muscle on this side had become permanently contracted, and to such degree in consequence of scurvy, while with the French army in Africa, as to effect a rigid closure of the jaw. The cure was, however, not completed until the surgeon, after the cicatrization of the wound, had divided also the *anterior fibres of the pterygoid muscles*, which formed a bridle behind the last molar teeth. (See also *American Journal of the Med. Sciences*, Vol. XXVI., Philadelphia, 1839, p. 218.)

While on the subject of the adjustment of disputed claims,—the preceding one having now we presume been put forever at rest,—we will remark, that we have in our notes to Vol I., taken occasion to bestow some laudation upon Dr. Mott, as the first person, who upon his last return from Europe, took an early opportunity to establish at the University of this city, and upon a secure basis, the valuable course of public instruction and gratuitous surgical services to the poor, known for the first time in our country, but for several years since in Europe as a *Medical and Surgical Clinique*.

Dr. March, an esteemed Professor in the Medical College of Albany, claims priority on this subject—by a year or two in advance of Dr. Mott. We are ready to concede to him all the praise he is thereby entitled to. But we will observe, that so far as public attendance and surgical operations, and medical prescriptions for the out-door poor soliciting advice at hospitals, dispensaries, &c., goes, the matter of *Cliniques* (applied in an inverse sense to the truth so far as the etiology of the word or *bed-side* practice is considered,) is quite an old affair all over the world, having been in common vogue for a century, or for half a century at least.

It is a source of infinite satisfaction both to Dr. Mott and myself, to have an opportunity at this late hour, of rescuing another and more important surgical claim from oblivion, by the accidental acquaintance we made during the past summer with the venerable Walter Brashear, M. D., for many years an eminent planter of Attakapas, Louisiana, and a senator of that state.

To our countryman, Dr. Brashear, who was a pupil of the eminent Dr. Ridgeley, of the continental army of the revolutionary war, and also a student at the University of Philadelphia, under Dr. Rush and other famous men of that day, are we indebted as is now ascertained, for the *first* operation, or amputation of the thigh at the hip joint or *coxo-femoral articulation* ever performed in America, and which was followed with complete success. This occurred as early as the year 1806, *only three years* after the illustrious Larrey had revived and perfected this operation in the campaigns of Napoleon. (See text of M. Velpeau on this subject, p. 637. &c. in Vol. II. of this work.)

With that self-neglect of one's own rights, that is ever a prominent characteristic of the diffidence of men of genius, and from his having early in life withdrawn from active practice, Dr. Brashear had never published this case. Dr. Mott therefore, as is seen in his case of coxo-femoral disarticulation in Vol. II. of this work, had hitherto supposed that he was the surgeon who in this country had first performed this important operation. With a magnanimity which ever belongs to him, and which we trust will serve as an emphatic lesson to those who in their malignity would rob and calumniate both the dead and the living, Dr. Mott cheerfully abstracts the plume from his own honored brows, that can spare many and much more like this, and affixes it upon the name of the gentleman to whom it rightly belongs.

As it may doubtless become the theme of future discussion, we take the opportunity of placing here upon the record, a too-brief account of the achievement of Dr. Brashear as communicated in his own words, in a letter we have had the honor to receive from that venerable surgeon.

*Philadelphia, August 13th, 1846.***MY DEAR SIR,**

In conformity to promise, I now give you a brief statement of the operation which I performed in Bardstown, Kentucky, in August, 1806, on the hip joint.

The subject was a boy seventeen years of age. Without assigning the causes which led to the necessity of the operation, the same was, after consultation with Drs. Harrison and Goodlet, conducted in manner following:—first premising, that in absence of any knowledge of an established mode for this operation, a common-sense reasoning as to its safety and facility alone dictated the manner of performing it. Therefore an operation of the thigh in the ordinary manner was determined on, as remote from the hip joint as circumstances might justify, (in this case about mid-thigh.) The amputation was performed, and the arteries secured.

The next step was to make an incision to and from the lower end of the bone externally over the great trochanter to the head of the bone and upper part of the socket. The dissection of the bone from the surrounding muscles, was simple and safe by keeping the edge of the knife resting against the bone. The bone being disengaged from its integuments at its lower extremity, was then turned out at a right angle from the body, so as to give every facility in the operation, to separate the capsular ligament and remove the head from its socket. After the operation, nothing more than ordinary dressings were used, and in the course of a short time the patient removed to St. Louis, where he was living within a few years past.

I am, very respectfully,

WALTER BRASHEAR.

*Dr. P. S. Townsend.*

It may be proper to state from the verbal communications we have had with Dr. Brashear, that the injury which led to the operation in question was a fracture of the thigh, complicated with much contusion of the parts, and which from bad management or neglect, or both, resulted in the establishment of an extensive and dangerous suppuration in the neighboring tissues and inter-muscular spaces.

To another of our countrymen and a citizen of New York, Prof. John W. Francis, M. D., we would with pleasure have also devoted a larger portion of space in the body of the text than we shall in this preface have an opportunity to do, had not the volume already become augmented to such size as to preclude the possibility of giving the details of all the interesting and important cases of ovarian and other tumors which have occurred in his obstetrical practice, and the principal part of which must be reserved for a second edition.

Professor Velpeau, in his various valuable publications on obstetrical science, has with his usual discrimination adverted to the several affections with which the uterine system is at times invaded, and hence we may account for the omission of his elaborate disquisitions in the present work, on the subject of the several forms of uterine tumors, and the disorders of the ovaria. A chapter of some extent might unquestionably be embraced in this work, on this great topic, so closely associated with medical and chirurgical practice, inasmuch as the services of several of our American practitioners and operators have shed light on the pathology of these disorganizations, and enforced by surgical measures additional means for the alleviation of these morbid conditions. The cases of extirpated diseased ovaria by Dr. M'Dowell, of Kentucky, as recorded in the Eclectic Repertory, evince not less the skill than the intrepidity of this bold operator of tumors connected with the uterus. We may search in vain I believe, for any instances of so formidable a bulk as that recorded by Professor Francis in his improved edition of *Denman's Midwifery*. The case fell under the observation of Professor Mott, and the circumstances characterizing the case are given in the work just alluded to with great minuteness. The patient was aged about 32 years: the tumor grew from the fundus of the womb, externally. According to evidence taken at the time of the post-mortem examination, the entire mass of abnormal growth, including several excrescences attached to the tumor itself, weighed one hundred and one pounds. Its fibrous nature was evident. Upon cutting into its substance in different directions, a sac was found in its right portion, out of which issued three quarts of a purulent and most offensive matter. The extent of the abdomen of the patient, before the removal of the tumor measured four feet eight inches and a half. Professor Francis has in the same work given other cases of fleshy tumors of the uterus; and in the

*New York Medical and Physical Journal* other instances of uterine affections with extensive ovarian dropsy.

In conclusion on the subject of *reclamations*, and without deeming it at all necessary to pay the slightest attention to some puerile and insignificant pretensions which have been set forth and vehemently insisted upon in sundry *professed* notices and maudlin criticisms on the two first volumes, we will here barely state, that in a respectful communication transmitted to us from DR. SAMUEL S. WHITNEY, under date of Dedham, (Mass.,) March 5th, 1846, he claims the honor of having been the first person,—and before Dr. Ruschenberger of the U. S. Navy, to whose communication (see Vol. II. of this work,) he alludes,—in this country at least—who clearly diagnosed a case of *unequivocal* aneurism of the *basilar artery*. Dr. Whitney says (see his case in the Oct. number of the Philadelphia *American Journal of the Medical Sciences*, for 1843,) that this occurred as early as the year 1841, and during the time he was making investigations and collecting facts in regard to *cerebral auscultation*.

Not only has the incomplete exsection of one half the lower jaw, and various portions of the upper maxillary bone, been long since performed by Dr. Mott and many other surgeons, (see text of Vol. II.,) but also recently the exsection of the *entire upper jaw on both sides*. This was accomplished July 23, 1844, by a surgeon of Germany, Dr. Heifelder, of Erlangen, on a male patient aged 23, for an indurated tumor, occupying the vault of the palate, and which had displaced and elevated the nose, &c. The operator made two incisions, each commencing at the great angle of the eye, and terminating at the commissure of the lips, circumscribing thus together a quadrangular flap, which was reversed upwards on the forehead. Passing Jeffrey's chain-saw through the left spheno-maxillary fissure, (fente,) he detached the maxillary bone from the zygoma; proceeded in the same manner on the right side, and then separated both bones from the frontal, os unguis and ethmoid by the same saw; separated the vomer and other adhesions with the scissors, and brought down and united the flaps by 27 points of suture. There was no hemorrhage or fever, and the cicatrization was complete in *four days*, and the patient was enabled to swallow with ease. Very little deformity remained, a cleft of 15 lines only being left on the median line of the vault of the palate, (*Wallher & Ammon's Journal für Chirurgie*, t. III., f. 4, p. 633, *Arch. Gén. de Paris*, 4e scr., t. IX., November, 1845, pp. 355, 356.)

A new method also of *curing false joints* has been proposed by the illustrious Dieffenbach. In a girl aged 14. (Dr. Hering, *Ueber das Wiedernatürliche*, Geilenk; Berlin, 1843, also *Arch. Gén.*, Sept., 1845, p. 100,) with a false articulation in the leg, he at first divided the flexor muscles, which drew the limb into an angular projection, viz., the tendo achillis, flexor longus pollicis pedis, and tibialis anticus, and then by means of two or three very narrow incisions leading down to the bones, applied a small perforating trephine, which he worked drill-fashion, as in lithotrity, till he had made 5 to 8 holes through the morbid osseous parts and their connections. Rapid cicatrization and perfect restoration of the limb followed a short confinement of the limb on a wooden gutter.

The diagnosis of *substernal aneurisms* (see Vol. II.,) is not the only one which has baffled the acumen of the most eminent surgeons now living in the practice of the stethoscope and auscultation. Even the fingers, and most refined sense of touch that can be acquired by long habitude with morbid growths, are frequently found to lead to the most humiliating results as interpreters of the real difficulties that exist. We have in this volume alluded, under the head of *Hematocele*, to the deductions made in one recent case, by the singular *tremulous* or *oscillating*, or *gelly-like sensation of fluctuation* imparted to the touch, and which after the operation was discovered to have proceeded from the coagulated or clotted condition of the contained sanguineous fluid.

In a recent successful extirpation by Dr. Mott, of a remarkable tumor involving the entire mamma, and of the rapid growth of only 8 months, in a married woman aged about 50, and the uniform ovate or oblong spheroidal shape of which, of the size of a fetal head at full term, was one remarkable feature, we saw a similar scene of embarrassment. Almost every person present was satisfied of a clear *fluctuating limpid fluid* in *large quantity* within the malignant production. Dr. Mott, as usual, was slow to express an opinion, and waited for the demonstrations of his unerring scalpel. The story was soon told, and we think to the astonishment of all.

There was first a regularly formed outer tough fibro-membranous covering of considerable thickness: next came another stratum *an inch thick*, of hard semi-transparent, homogeneous gelatino-aluminous tissue, (similar to what is sometimes seen in the hypertrophy of the bronchial glands at the bifurcation of the trachea,) and finally, within, and close and next to this last, and forming the central nucleus of the tumor, and about three inches in diameter, a red, semi-transparent globose mass of softest friable coagula apparently, and no doubt in fact the residuum of an ancient hematocoele,—but *no water* any where between these strata or none to speak of, sufficient to convey the slightest degree of hydropical fluctuation properly so called. It was the *coagula*, or as I conceive the debris of coagulated fibrinous blood that imparted the deceptive sensation of fluctuation, and which fluctuation was in truth, as far as my own examinations went, precisely of the *tremulous* or oscillatory character already mentioned.

It was our intention, but for the size of this volume to have inserted under the article of *laryngo-thyroidian bronchotomy*, a highly important case, in which a large shawl or hair-pin near two and a half inches long, and with a head the third of an inch in diameter, and lying with its head upwards, and playing up and down in the larynx, was successfully extracted by Dr. Mott, from a child aged about three years, the daughter of Lieut. Governor H——, of Connecticut. We have however, in a note (p. 656, 657, vol. I.) alluded to the important and neglected practical point to be attended to in such operations, especially in children, viz. the danger of cutting carelessly down into the air passage through the engorged tissues, and the necessity of guarding with the utmost precaution against the slightest admission of blood into the respiratory tube.

We could also have expatiated upon the recent, still more remarkable operation, in which a gold piece of coin, viz., a *half sovereign*, was by an ingenious contrivance of Sir Benj. Brodie in inverting the body, successfully removed from the larynx of a son of Mr. Brunel the celebrated English engineer, after all hope of recovery almost had been extinguished. This case however, has been so frequently detailed in the principal publications both in Europe and America, that the mere allusion to it at present may suffice, until the opportunity shall present of another edition of this work. We will now, until such event may arise, bring this work to a final close, with the single expression, that my respected associate and myself, can both conscientiously declare, that without fear or favor, we have endeavored, to the utmost of our ability, to fulfil in a proper manner all that we promised, and to present to the profession, to the practitioner as well as to the student, a complete and systematized elementary treatise on Operative Surgery, embodying all its most valuable history and processes down to the present moment, in such purity of diction, and upon principles so orthodox, that it might be deemed worthy for a long time to come, to occupy a permanent rank in the hands of every person devoted to this now-absorbing and most clearly-defined department of the healing art.

P. S. T.

NEW YORK, February 2d, 1847.



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NEW ELEMENTS  
OF  
OPERATIVE SURGERY.

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SECTION TWELFTH.

TUMORS.

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CHAPTER III.

LYMPHATIC TUMORS.

I MEAN here by lymphatic tumors, the tumors which are formed by degenerate lymphatic glands, (ganglions.) It is a class of tumors of which, up to the present, scarcely anything has been said in works upon operative surgery. Generally the treatment of them has been confined to topical applications and general remedies, (*médications*;) but I have long since satisfied myself that surgical processes are frequently their best, and sometimes, in fact, their only remedy. This is also, I believe, the opinion of M. Warren (*on Tumors*, etc., p. 162.) Those tumors which are sometimes the result of a simple hypertrophy of the natural elements of the organ, at other times formed by the establishment of a variable number of clots (*grumeaux*) of concrete pus, or of tuberculous matter, or of cysts or purulent abscesses (*foyers*) which are disseminated as it were in the parenchyma of the hypertrophied ganglionic tissue, represent masses which are very tardy in contracting adhesions to the organic layers which surround them. When they have once acquired a certain degree of hardness, and have continued beyond six months or for a year, it is rare that they disappear by resolution, (i. e. *resolvents*.) They then rest on the tissue like so many foreign bodies, whose internal morbid action, (*travail central*,) usually very slow, approaches by degrees the neighboring ganglions, (i. e. lymphatic glands or ganglions,) produces an indefinite enlargement, or a fungous degeneration, or suppuration, or ulceration of the primitive masses. We may conceive, then, the advantage which would result to patients if it were possible to destroy such tumors surgically. We have in practice three modes which we may resort to in such cases with some chances of success: These are *crushing*, *setons* and *extirpation*.

## ARTICLE I.—CRUSHING.

The crushing of engorged lymphatic ganglions, which was proposed and put into practice in a certain number of cases by M. Malgaigne, is not so irrational as might at first view be supposed. The tumor broken up (*broyée*), comminuted (*morcelée*), and reduced into a pulp (*bouillie*) underneath the integuments which remain intact, is then placed in conditions similar to those of a tumor formed by clots of effused blood. Permanent compression succeeding to crushing, properly so called, sometimes induces the matters thus broken up to be absorbed, and then resolution is thereby evidently rendered more easy; only that it is unfortunate that the inflammation from being chronic, often passes in this manner into an acute state, and to such degree as to sometimes transform the lymphatic tumor into a true abscess, the healing (*mondification*) of which is then always tedious and difficult. There are also a great number of cases in which the crushing cannot be performed but with great difficulty. It cannot in fact, be undertaken but for tumors which are absolutely external, and for those which rest on some solid point of support.

M. Malgaigne, who has employed crushing only for ganglions of the groin, used for this purpose the thumb or thumbs applied with force and directly from before backwards on each tumor. In proceeding in this manner there is sometimes need of a great degree of force, and most of the tumors cannot be broken up by this mode. There might also, perhaps, be danger in this region of doing some mischief to the femoral artery. In that region, as well as in the axilla, and under the jaw, and in the neck, I have found it answer better, when the condition of the parts allow of it, to seize the tumor between the fingers or between two smooth pieces of pliant wood, and thus to compress it with a sufficient degree of force upon the sides, and successively upon all the points of its circumference. Many lymphatic ganglions, treated by this process, have, as it has appeared to me, restored themselves afterwards with a promptitude which the long duration of the disease had scarcely permitted me to hope for. But I hasten to declare that crushing nevertheless, is a method which is exceedingly uncertain, and one that cannot be attempted but in a very small number of cases.

## ARTICLE II.—SETONS.

M. Levanier, a surgeon of Toulon, asserts that he has succeeded in effecting the rapid dispersion of inguinal tumors of very long standing, by traversing them with small setons. These consist of simple threads, which are passed by means of a needle through the entire thickness of the ganglion, in which they are left to remain for four, five or six days, and then withdrawn to be replaced by new ones in different directions. One, two, or a greater number of threads are introduced in this manner at the same operation or after an interval of some days, in the same way nearly as I have said in speaking of erectile tumors. The suppuration which is established in the track of each of these threads soon reduces the engorgement of the ganglionic tissue,

and the molecular or interstitial absorption of the tumor afterwards continues to go on without interruption to the termination of the cure.

Without conceding as much confidence to this method as M. Levanier, which moreover I have as yet employed but on two occasions, I nevertheless believe it worthy to be made trial of, especially for ganglions that are of little volume, situated in regions where extirpation would be dangerous, and existing in patients who prefer submitting to all the uncertainties of doubtful processes, rather than recur to the resources of a cutting instrument.

### ARTICLE III.—EXTIRPATION.

Up to the present time, lymphatic ganglions have not been subjected to extirpation but by a very small number of surgeons. The reason of this peculiarity is owing to two circumstances: 1, lymphatic ganglions scarcely ever become engorged or degenerate except from the influence of remote causes; so that there are almost always a certain number of them diseased at the same time, and that it is rarely possible to remove them all; 2, considered as the result of the disease denominated scrofulous, they have been deemed to form only a symptom, or indication (*ombre*) of a general affection, so that their removal would remedy nothing, or the least important element only of the malady. In this matter we must understand ourselves correctly. If the lymphatic tumors are in reality imputable to a general constitutional affection, their extirpation should not be attempted. It is the cause which we must first attack and not this feeble symptom. Nor should we moreover extirpate them, when, notwithstanding they have been produced by an external cause, they are numerous and diffused, [*disséminées*—i. e. existing in various regions. T.] But if there be one only, or if notwithstanding their number, they are well isolated and easy of dissection, we are not to hesitate. If there is reason to suppose that the constitution is good, and that the interior of the splanchnic cavities is not compromised, their removal offers incontestable advantages. Different also from cancerous tumors, degenerate lymphatic tumors possess also this remarkable feature, that the extirpation of those that are most diseased or most voluminous, rather favors than prevents the diminution (*dégorgement*), resolution or dispersion of the others. Thus have I frequently confined myself to the extirpation of a single one, or of a certain number of these tumors, though I knew perfectly well beforehand that I should be obliged to leave many others. Having thus extirpated those which were ulcerated, or very salient externally, or those which occasioned most inconvenience and deformity, I have frequently noticed that the others continued in the same condition they were before, or that they afterwards imperceptibly disappeared. Moreover, those that have advanced farthest being destroyed, nothing prevents our healing the others by the same topical applications, and of submitting the patient to the different courses of general treatment which are deemed to possess the greatest efficacy. When we reflect upon the manner in which these tumors terminate by suppuration, and upon the character of the ulcers, burrowings (*décollements*) and cicatrices which they establish in the skin, even when they get well without an operation, we may well be permitted to consider the

advantages which their extirpation might procure. The extirpation having been once decided upon, there is no serious preparation required for the patient : if the skin is not changed and the tumor be not of a large size, we may confine ourselves to a simple incision of the integuments. In the contrary case, we comprise the degenerated tissues in an elliptical incision more or less elongated, as in the extirpation of any other kind of tumors. In the place of the T or crucial incision which are generally preferred when the tumor is of a large size, I am in the habit of substituting the semilunar incision, so as to construct a flap which is reversed from the free border to the base, and which allows of every possible facility for the rest of the operation. The incision of the integuments having been effected, the surgeon proceeds to the dissection of the tumor. In the event of this being occupied by cysts or purulent or tuberculous layers, we should be cautious not to excise their tissue. In whatever way we proceed, it is better to hook fast of the tumor with a simple or double ergne, which should be then immediately consigned to the care of an assistant. Then holding the parts asunder by means of the fingers or forceps, the surgeon divides and detaches them with caution by means of a straight bistoury. As these tissues are only superposed upon (appliqués) or cling loosely around [collés—means here to invest, or to be loosely attached to, T.] the ganglion, it is generally easy to isolate them from it. Also the enucleation [of the tumor] by means of the finger or the handle of the scalpel ought in these cases to be substituted for the cutting instrument, whenever we perceive that there would be any actual danger of wounding the large sized vessels or nerves. On the other hand, masses to be extirpated that have no character of malignity, do not exact that we should extirpate the last portions of them with the same care that we do in cases of cancerous tumors. So that in all cases during the course of the dissection, the bistoury ought to be directed upon the exact limits or circumference of the tumor rather than in an opposite direction. We may for the same reason make use of the fingers for the purpose of detaching or even tearing out the remaining roots of the diseased ganglion, when it is deeply situated, or is found to be implicated with organs which it would be dangerous to approach with the bistoury. In delicate regions, and where the lymphatic tumors are composed of many lobes united by simple pedicles, there is no impropriety in detaching that which presents itself the first, in order afterwards to seize successively upon the others. We thus cause less destruction of parts, and more easily preserve the other tissues. Of all other tumors moreover, the lymphatic or ganglionic are those which the most frequently require a ligature to be applied to their root when we undertake their extirpation. In fact, if, after having isolated their cutaneous surface or circumference, we should have any apprehension in separating the root, that we might open into large veins or arteries which it might afterwards be difficult to reach or tie, we strangulate these tumors as deep as possible by means of a ligature composed of two to five braids of thread, so as to interrupt their entire circulation in such manner as to cause their separation, or to enable us to excise them as we have said under the chapters on *Cutaneous and Erectile Tumors.*

*Dressing.*—After the extirpation of lymphatic ganglions, the *haemostatic* means and the *dressing* of the wound exact the same precautions as after all capital operations. I ought to remark however, that except in a small number of cases, immediate union does not here succeed, and that in attempting it there are more inconveniences than advantages. The wound being almost inevitably anfractuous and constituted of irregular cavities, necessarily presents walls which it is next to impossible to bring into exact coaptation. Their tegumentary borders are closed and agglutinated with facility; but collections of blood, lymph or pus, which are soon established underneath, sooner or later compel us to re-open them, and favor the development of purulent centres, and phlegmonous erysipelas, a hundred times more formidable than a wound which has been left to discharge by second intention. Unless, therefore, the ganglion removed should be smooth (unique) and the wound exhibit great regularity, I would not advise in these cases to attempt union by the first intention. I have now (1838) performed extirpation of lymphatic tumors on near a hundred persons, and none of those who have been dressed in the manner I am about to describe, have experienced serious accidents; whilst I have almost always found phlegmasias and suppurations supervene in those in whom I have attempted the cure by immediate union. I first introduce small balls of fine lint into the bottom of all the cavities, and fill up in this manner the entire wound, which I cover over with perforated linen, then with plumasseaux, compresses and a containing bandage. When the blood flows in abundance, without there being any large arteries to tie, I pile up these balls in such manner that they may exercise a sort of compression under the bandage. I use but a small number of them on the contrary, and such as are of the most pliant kind, when there is nothing to fear in regard to hemorrhage. In proceeding in this manner the dressing is prompt and easy, and the results simple. At the end of two or three days we may, without inconvenience, remove the whole dressing down to the perforated linen. A day or two more gives time for the exudation from the wound to saturate the balls which fill it, and to allow of our removing them without any effort and without occasioning any serious pain. Each day we deposit in the wound a less quantity of these balls, and nothing is so rapid as cicatrization in these cases, so much so in fact that most of the patients are cured in the space of from fifteen days to a month. It is besides remarkable that out of near 100 patients operated upon by me for these kinds of tumors, there are up to the present time, but three who have died. I am so much the more surprised at this, because in a great number of them, the operation was long, laborious, painful and really serious. Though in some of these patients there still remained other degenerate lymphatic ganglions, though in two or three of them these new tumors continued afterwards to undergo a great enlargement, it is certain that in the great majority of cases, the cure was prompt and radical, and that the ganglions that were left have, in the greatest number of instances, ultimately retrograded, by gradually re-assuming their natural condition. Up to the present time I have performed extirpation of lymphatic tumors only in the inguinal, humeral, axillary, supra-clavicular, submaxillary, parotid and sterno-mastoid regions.

### § I.—*Ganglions of the Groin.*

Lymphatic tumors of the inguinal region present three modifications, which it is important should not be confounded : those which are connected with a venereal affection ; those which depend upon some disease of the foot or leg ; and those which belong to the class of cancers. In those cases where their origin depends upon a syphilitic infection, we must never, however ancient they may be, attempt their extirpation before having submitted the patient to the specific treatment of venereal disease. If the alteration of the lower limb which has been the cause still exists, it is also prudent when practicable, to effect the removal of this before every thing else. But if, when these precautions have been attended to, or are not practicable, the tumor is hard, of a certain volume, and has existed more than six months, after having been unavailingly attacked by topical applications and the suitable general remedies, then is the operation indicated, and it becomes proper to perform it. We should not nevertheless under these circumstances, undertake it in cases of cancerous affection, or where the chain (chapelet) of lymphatic ganglions which is prolonged into the iliac fossa was at the same time implicated in the least degree of engorgement. In cases of hypertrophy, however, or of simple degenerescence whether fungous or tuberculous, a slight degree of engorgement of the supra-inguinal ganglion would not be a formal counter-indication ; as the removal of the principal tumor would have the effect in many cases to cause it to disappear. The extirpation of lymphatic tumors in the groin is one of the delicate operations of surgery. The proximity of the crural artery and vein, and their branches, and of the internal saphena vein, and the femoral nerve, will always render it difficult and formidable. The dangers it involves are nevertheless not the same in all cases. So long as it is a question only of sub-cutaneous ganglions, it is in fact possible, with a little address and anatomical knowledge to accomplish it without danger ; but if the deep-seated ganglions formed the tumor, it would become necessary to renounce it, or to decide upon tying the vessels on the side of the iliac fossa, for chance alone would enable us to avoid them during the operation. When we operate for the extirpation of the lymphatic glands enveloped in the sub-cutaneous fascia, we may also find ourselves placed in two different positions. Sometimes in fact, it is the sub-inguinal ganglions that are to be extirpated, while in other patients it is the glands in the inguinal groove itself.

A. *Sub-Inguinal Tumors.*—Here the tumors have no relation with the crural vessels properly so called ; they are separated from them not only by the fascia lata, but moreover by the internal border of the sartorius muscle. It is upon the line of the saphena vein that they are situated, and not in the direction of the crural artery, unless however, they should be prolonged as far as to the external orifice of the crural canal above. The patient being placed upon his back, should have the limb reversed upon its outer side and moderately flexed. An assistant fixes it in this position, while another looks to and prevents the movements of the pelvis. The surgeon placed on the outside and provided with an ordinary bistoury, divides the integuments from above downwards for the right thigh, and from below upwards for the left thigh,

as has been said above. We might in like manner place ourselves always on the right, in order that the incision might always be made from above downwards, or on the left side if we preferred performing it from below upwards for both sides. We may go with the first cut and without fear down to the sub-cutaneous layer. After having isolated each side of the wound from the corresponding parts of the tumor, we raise up the latter and give the erigene to an assistant, who should carefully follow all the movements of the operator. After having dissected it upon its sides to nearly as far as its root, the surgeon detaches it by small cuts from below upwards, and in such manner as not to wound the internal saphena vein. If, however, the situation of the tumor, or any particular circumstances should have led to the wounding of this vein, it would suffice to compress it below, and afterwards to manipulate the instrument with extensive strokes, in order to terminate the operation rapidly. Nevertheless the surgeon ought to be then aware that in this region the upper end of the veins sometimes gives rise to a pulsating (*saccadée*) hemorrhage, sufficiently obstinate to oblige him on his part to compress the artery, or even to apply the ligature to it. However, it rarely happens but in approaching their upper extremity, that it becomes advisable to adopt serious precautions in relation to the arterial vessels. Upon the supposition that we should have occasion here for the semilunar flap of which I have spoken, it would be better to turn its free border inwards than to the outside; in the same manner that we should divide the inner rather than the outer lip of the simple incision, if we preferred using the T incision. As to the dissection of the ganglions themselves, prudence requires that we should perform it on the inner side first, then on the outer side, then from below upwards, and to terminate at the inguinal extremity. In this manner nothing would then prevent us, should they appear to be prolonged by means of a pedicle into the crural canal and to the side of the vessels, from strangulating their root before completing their excision. If immediate union can be attempted after extirpation of lymphatic tumors, it is assuredly in the region under consideration. We should have recourse to it if the wound is regular, if the cutting instrument has sufficed for the division of all the tissues, and if after the ligatures are applied, the sanguineous exudation has a tendency to cease of itself. For this purpose the limb is straightened, after which, by means of a sufficient number of strips of adhesive plaster, we approximate and keep in contact the two lips of the wound. A perforated linen, a large gateau of lint, and some turns of the roller bandage with a spica to the groin, complete the dressing. In the contrary case, the solution of continuity is filled with small balls of lint before applying the other portions of the dressing of which I have just spoken. In either case, we afterwards place the ham and the leg upon a pillow in a moderate state of flexion.

*B. Inguinal Tumors.*—In the fold of the groin, lymphatic tumors are situated sometimes on the inner and sometimes on the outer side, or on the side towards the pubis or that of the spine of the ilium, and sometimes even on a line with the femoral artery. This difference of situation as may be imagined, renders their removal either very simple or exceedingly difficult: In a man in whom ten months before I had

extirpated a cerebroid cancer from the scrotum, I was obliged to remove a tumor of the same nature which had developed itself in a lymphatic ganglion external to the symphysis pubis, and which, having acquired the volume of the first, had extended outwardly as far as upon a line with the femoral vein. In another case I saw a purely lymphatic tumor which occupied the entire space comprised between the antero-superior spinous process of the ilium and the track of the vessels. A woman upon whom I operated in 1836 at the hospital of La Charité, had in the fold of the groin a lymphatic fungus of the size of an egg and which had been ulcerated for more than a year and was situated in the front part of the crural canal itself. Such facts are not rare, and it would be easy for me to show numerous examples of them. To perform the operation the patient should be placed and held as in the preceding case. Nor can any precise rule be given here for the direction of the incision of the integuments. If the straight incision would answer, it should be made in the direction of the fold of the groin or of the long diameter of the tumor. If the curved incision should be preferred, or become necessary to be employed, the free border of the flap must be made upon the outside and below, in which direction also the outer lip of the first incision should be divided, provided the T incision should be thought most advisable. Internal tumors should be dissected in the manner of sub-inguinal tumors, first upon the inner side, then outwardly, and finally from below upwards. The external ganglions should be dissected by a rule directly the reverse, and this in order to reserve for the last thing the most delicate stage of the operation, to wit, the isolation of the tumor at the most proximate point to the vessels. By means of these precautions we may proceed without any very great degree of danger as high up as to Poupart's ligament, or on a line with the apex of the fossa iliaca. When the diseased ganglion occupies the middle of the groin, we isolate it successively upon its two sides up and down, in order not to lay bare the pedicle until the last thing. So long as the surgeon, in order to effect this, is not obliged to divide the aponeurosis, there is nothing to fear, and should the tumor not be prolonged into the iliac canal, he may cut off its root without a previous ligature. But should he at all apprehend the extension of the pedicle of the tumor to the neighborhood of the trunk of the saphena, he will, after having reduced it to a small volume, surround it with a ligature and strangulate it with force before excising the ganglionic mass on the outer side. In the case of the woman I have just mentioned, I was obliged to lay bare the saphena vein as far as its entrance into the crural vein; but by dissecting the tumor horizontally I was enabled to isolate it without any ligature, though the artery was afterwards noticed upon the inner side of the bottom of the wound. I would not hesitate, therefore, to attack lymphatic tumors in this manner, even in the iliac fossa, should they be prolonged to that part, provided they were situated externally to the vascular trunks. Even if it were necessary I would divide the ligament of Fallopius, in order that we might by means of the finger, tear out these tumors or enucleate them in such manner as not to run any risk of wounding the principal arterial branches. But as I have already said, I would no longer hazard such an attempt if the tumors were cancerous, or the vessels surrounded as it were by the

tumors, and that there was ground for believing that there existed degenerate ganglions in the neighborhood of the lumbar region. The dressing in the groin presents some difficulties in addition to those of the preceding case. The application of adhesive straps in this place offers but a feeble resource. The tissues of this region are less homogeneous, and the disposition of the skin there is very ill calculated for primitive agglutination. Nevertheless, if the wound is uniform and in the direction of the inguinal groove, a slight flexion of the thigh may be found sufficient to maintain the two lips of the wound in coaptation. With this exception the dressing flatwise, by means of small balls of lint, the perforated linen, the gateau of lint and the spica, appears to me to be decidedly preferable.

[Having purposely devoted a great deal of personal investigation and practice while at the Seaman's Retreat Hospital, to dressing the ugliest kind of shelving, jagged and leaden-edged, deep, sinuous, and irregular wounds left in the hollow of the groin in syphilitic cases, by burrowing abscesses and discharges succeeding to buboes and mercurial drugging, and where the wound penetrated sometimes to the depth of an inch and a half or more, and as high up as the crural arch and inguinal canal; I can testify to the pre-eminent advantages of *tight, forcible strapping* by multiplied and very long strips of adhesive plasters, decussating each other on the abdomen and down and across the thigh in every direction, so as to form a firm *stellated* support, or covering, requiring only a slight inward flexion of the thigh and persevering use of this mode to hasten granulation from the bottom, and a perfect coaptation of the edges with great rapidity and without the necessity of any auxiliary means but stimulating injections every few days this dressing is renewed. If they succeed thus with the general constitutional treatment in such desperate chronic anfractuous and *cavernous* wounds, surely they should never be neglected in the fresh wound left by extirpating lymphatic glands. T.]

## § II.—*Lymphatic Tumors of the Arm.*

Although lymphatic tumors may become developed upon the track of the cephalic vein and in the deltoid region, it is nevertheless almost exclusively upon the inner side of the arm that these tumors have been noticed. Here they may be found at all the different points of the track of the artery. Nevertheless it is at an inch or two above the inner condyle that they are most frequently met with. To extirpate them in this region the arm must be held off from the trunk, and the fore-arm extended in supination. A longitudinal incision ordinarily suffices. Commenced above and terminated below the tumor, it almost always allows of our arriving immediately upon the pedicle of the latter. It is moreover important during the dissection, that the lymphatic mass should be properly drawn out from between the lips of the wound by an assistant provided with an erigene, while another assistant should always stand ready to compress the brachial artery in the direction of the axilla. The tumor having been detached from the biceps in front and the triceps behind, may afterwards be isolated upon its deep-seated face without any very great difficulty, and without the danger of wounding any-

thing, if the surgeon is careful to carry the point of his bistoury parallel with the plane of the interior surface of the arm, and to graze with accuracy the ganglionic tissue. The ulnar nerve, the median nerve, and the brachial artery, which it quite frequently touches, would nevertheless oblige him to strangulate the pedicle of the tumor with a strong ligature, should it send off any prolongations between them, or should it appear too difficult or dangerous to complete its enucleation either with the fingers or the handle of the scalpel. Here also union of the wound by first intention, offers some prospect of success. Circular strips of adhesive plaster and a graduated compress on each side, the perforated linen, gateau of lint, square compress, and roller bandage, will always offer a facility for this, unless there should be particular difficulties in the way; we should therefore have recourse to it in the greater number of cases. If however, the slightest accident should supervene, or the least difficulty interfere, we should recur immediately to the small balls of lint and the simple dressing. The limb is then placed in semi-flexion and upon a cushion or pillow, until the stage of the primitive accidents has passed by.

### § III.—*Lymphatic Tumors of the Axilla.*

The hollow of the axilla is a region where the lymphatic ganglions frequently become engorged and degenerate. Diseases of the breast and all those of the thoracic limb, occasion there a sympathetic action (*retentissement*), which makes the hollow of the axilla the locale (centre) of an infinity of tumors of different kinds, but which almost all of them, have the lymphatic ganglions for their seat. If it be true that surgeons rarely decide upon extirpating these kinds of tumors, it is in part owing to their nature, which does not allow of our always considering them as a local and independent disease, and again, because the operation is in itself of a delicate nature, and one which is in reality serious. The axillary vein and the branches which it receives in the first place expose us to a sufficiently abundant hemorrhage when we happen to wound them, and afterwards there is danger of that introduction of air which appears so frightful and so difficult to prevent in certain regions, (see Vol. I.) The artery of the same name which it may be impossible to avoid, and the nerves of the brachial plexus also constitute so many circumstances to arrest the hand of the operator. In adding to these that the manipulations of the bistoury are also necessarily restricted by the arrangement and relations of the pectoral muscles in front, those of the shoulder behind and on the outside, and of the chest on the inner side, we have a sufficient explanation of the reserve exhibited by surgeons in this matter. Having, however, frequently encountered lymphatic tumors of the axilla which nothing could disperse, and which were gradually conducting the patients to the tomb, I have thought nevertheless that I could surmount those objections, and now extirpate tumors of the axilla, after the same indications as those for the inguinal region; it is in fact an operation which, since the year 1837, I have performed a great number of times, and under circumstances greatly diversified. From whence I have acquired the conviction that this operation, as I am about to show, is in fact much more frightful [effrayante, i. e., in ap-

pearance, T.] than in reality dangerous. Many of the patients upon whom I have performed it, had tumors of an enormous volume, which raised up the pectoralis major, surrounded the brachial plexus and vessels, or were prolonged at their upper part as high up as the supra-clavicular depression. Out of an aggregate of about 25 examples which I could enumerate at the present time, there have been only two cases of deaths; one of which was a young woman upon whom I operated in 1828 at the clinique of M. Bougon. The tumor, which was of the size of the head of an adult, completely filled the hollow of the axilla, ascended as high up as above the clavicle, and required an extremely extensive dissection. The patient, after having exhibited some encouraging indications of a cure, was seized with a pleuritic effusion and died at the end of three weeks. The second patient was a woman nearly sixty years of age. All the ganglions of the axilla had to be torn out, one after the other; an enormous cavity was the result, which, however, was in great part filled up when a diffused (ambulant) erysipelas supervened and carried the patient off. A third patient who had undergone a similar dissection, died at the expiration of two months, in consequence of accidents disconnected with the operation. All the others operated upon recovered, the most of them very rapidly, that is to say, within the space of fifteen days to a month or six weeks. An inconvenience which retards the cure in this operation, where we are obliged to liberate the part from its ganglions, is the interruption to the circulation of the lymph, and a tendency to engorgements and infiltration of the hand and fore-arm. There may also result from it so great a contraction of the hollow of the axilla, that the movements of the shoulder and the separation of the arm, especially from the trunk, may be greatly obstructed. The manner of performing the operation, though varying according to the size and precise situation of the tumor, is, however, reduced to two processes: one which consists in penetrating into the hollow of the axilla without dividing the muscles; the other in dividing at first through the lower border of the pectoralis major muscle, or even the whole thickness of the two pectoral muscles as high up as to the neighborhood of the clavicle.

A. *By the hollow of the axilla.*—It rarely happens that the incision at the hollow of the axilla does not answer for the operation in question; the preferable position of the patient being upon a bed, rather than seated on a chair. One assistant is to draw the arm towards him, while another stands ready to compress the subclavian artery upon the first rib. The surgeon, provided with a straight bistoury, makes his first incision which comprises the entire length of the great diameter of the hollow of the axilla, and extends from the upper part of the arm to below the tumor or even to the side of the chest. Upon the supposition that this first incision will alone answer for the whole dissection, it is better to place it rather behind than too near the anterior border of the axilla; in the contrary case, should it become advisable to divide its posterior border, it is more proper to place it altogether in front. Having thus divided the integuments, sub-cutaneous fascia and aponeurosis, we introduce a finger into the wound to serve as a guide for the simple or double erigne, which is immediately to hook up the mass to be removed. The surgeon then dissects the

tumor in front, and behind, and on the inner side, and finally from below upwards, in proportion as the assistant draws upon it in the direction required. Having arrived into the hollow of the axilla itself and upon the side of the arm, I have often succeeded in detaching it completely by means of short strokes with the bistoury, while the forefinger of the left hand directed backwards and deep, by raising up the brachial plexus or the vessels, acted as a director. This stage of the operation, which sometimes enables us to dissect the important organs in the hollow of the axilla in the same way as for an anatomical preparation, is too delicate and hazardous to permit me to lay down a general precept. The best mode then is to tear out gently, though with force and by means of the finger, all the lobules of the tumor which appear to be interspersed among the vessels or nerves, or which are prolonged to too great an extent in the direction of the clavicle and the regions of the neck. Should the engorgement of the ganglions be prolonged only by a pedicle above and to the outside, it would be still more easy to surround it with a triple thread and to strangulate it forcibly, in order to excise the whole gland immediately below it. By means of these precautions we remove with promptitude and facility, tumors which do not exceed the size of an egg. We also extirpate without danger or any very great difficulty, those which are too much enlarged and which present themselves under the aspect of bunches of grapes when occupying principally the thoracic wall of the axilla. There are no real difficulties or dangers therefore but for those tumors which rest against the root of the arm or articulation of the shoulder, and for those which are prolonged to above the clavicle. Ordinarily during the entire operation there are but a small number of arteries opened. These are the branches of the external mammary artery, those of the anterior (*anterieurs*) thoracic arteries, of the common scapular artery, and rarely the internal circumflex artery. We might apply the ligature to them in proportion as they are divided, but there is but little inconvenience in causing them to be covered temporarily by the extremity of a finger, and in waiting until the end of the operation before tying or twisting them. I have no need of remarking that if unfortunately the axillary artery should have been wounded, as in the case mentioned by M. Wolf, (*Graefe und Walther Journal*, t. VII., p. 261,) it would also become necessary to apply the ligature instantly. The hemorrhage at this time, which is most troublesome, is almost always furnished by the veins; so much the more so because in the axilla as in the groin, the venous reflux which might under these circumstances extend back even to the heart, is not yet entirely annihilated. This kind of hemorrhage moreover which we first arrest with the finger, afterwards readily yields to tamponing and compression. The proof of this I have from having seen the axillary vein itself opened in an operation of this kind. I lay it down as a principle not to attempt immediate reunion in these cases. For they are of those in which the extirpation of the lymphatic tumors leaves a cavity too anfractuous and a wound too irregular to make it possible to hope for primitive agglutination. I place therefore small balls of soft lint upon all the points of the traumatic cavity, until it is well filled with them and that they produce a certain degree of compression, should it seem requi-

site to adopt any precautions against the flow of blood. A perforated linen, a gateau of lint, and one of the ordinary bandages for the axilla, serve to complete and to sustain the dressing.

B. *In front of the axilla.*—If owing to its absolute volume or primitive situation it should become impossible to enucleate the tumor by the hollow of the axilla; if, as I have seen it in attendance with MM. A. Bérard and J. Cloquet, in a young subject aged ten years, the tumor should appear to be situated between the two pectoral muscles, or seem agglutinated as it were upon their posterior surface, it would be better to divide the anterior wall of the axillary region than to operate in the manner I have just described. In a young girl whom I have spoken of farther back, and whom I operated upon in 1828, it became necessary to divide the tissues obliquely from above downwards and from before backwards, from the inner third of the clavicle to the lower border of the latissimus dorsi muscle. Another incision parallel to the posterior border of the axilla thus circumscribed four flaps, two smaller which I reversed downwards and backwards, and two very large which I dissected, reversing one of them upon the side of the sternum, and the other upon the shoulder. These two last, comprising the entire thickness of the pectoral muscles, enabled me to detach little by little from the front part and side of the chest, the totality of the tumor, which it afterwards became necessary to isolate behind from the sub-scapularis muscle, from the border of the clavicle above and in front, and from the whole brachial plexus on the outside, and finally to extirpate it from the supra-clavicular depression, where one of its roots of a sufficiently large size had been prolonged. We might here easily avoid the necessity of posterior flaps by substituting the T for the crucial incision. The horizontal branch of the T being placed behind and parallel to the posterior border of the axilla, would put it in our power to fall upon it with an incision which would be vertical or more or less oblique, and which should set out from the front part of the clavicle. The two large triangular flaps circumscribed in this manner, would give every facility desirable, and would accommodate themselves in a remarkable manner to every possible mode of dressing. If the tumor should be more projecting in front than above, it would be practicable to lay it bare with still greater ease by means of the semilunar flap of which I have so frequently spoken. The free border of the half-moon in this case might be turned downwards towards the axilla, inwards towards the sternum, or outwards towards the arm, according to the form of the tumor or the particular indications. It would be necessary for the same reason to cut it out upon a curve of greater or less depth, and more or less elongated. This flap, being raised up upon its base, would allow as readily as the others of dissecting out the tumor up to its termination, and would be attended with the advantage of reducing the operation in fact to the condition of a simple incision. The section of the fleshy fibres which might here interpose, presents nothing in itself serious. What I have said of the division of the tendons and muscles (see Vol. I.) is sufficient to show that misapprehension had prevailed in this matter. If the operation, therefore, by this division would be made more simple and less dangerous, we ought not to hesitate; we should operate also

in front rather than at the hollow of the axilla. The dressing after extirpation of tumors of the axilla by this process, enables us better than the other to undertake immediate union. Whatever may be the form of the flaps, they should be brought together and approximated in such manner as to leave a void only at the depending point of the axillary cavity. They are to be consequently replaced in such a way as to reconstruct, as completely as possible, the anterior wall of the axilla. But I would recommend to leave a meche or tent, or some rouleaux of lint between the lips of the lower part of the wound, so as to provide at that place for the egress of the discharges. This mode of reunion is effected at the axilla as every where else, by means of simple strips of adhesive plaster, aided by position or the suture. I ought to remark before concluding, that in operating at the hollow of the axilla, should the simple incision not answer, we might equally substitute with advantage for the T or crucial incision, that of the semilunar, taking care in that case to turn its free border backwards and outwards. In whatever way the operation and dressing may have been performed, the arm should be kept immovable and slightly raised up towards the shoulder. After the first dressings, it is important, however little the purulent matters tend to stagnate, to open a passage for them. It is at this period therefore that we must prevent the too rapid union of the lower portion of the wound, separate the arm a little from the trunk, substitute emollient cataplasms for the lint, or even have recourse to emollient and detergent injections into the traumatic cavity. Acting upon these principles I have frequently removed tumors from the hollow of the axilla, which many practitioners had refused to extirpate. (Dufresse, *Journ. Hebd.* 1835, t. IV., p. 276.) The tumor in the form of a bunch of grapes, which almost equalled the size of an adult head, and which M. Goyrand (*Lancette Franc.*, t. II., p. 256) successfully removed under the impression he was operating for a scirrhus, was probably a lymphatic tumor. M. Lallemand (Lafosse, *Clin. de l'hôpital Saint Eloi*, p. 4) who employed the suture to unite the wound, and who also supposed he had extirpated a cancerous tumor, likewise as it appears to me removed only degenerate lymphatic ganglions. Though no one moreover up to the present time had laid down precise rules in respect to the operative manual in the extirpation of tumors of the axilla, it is nevertheless true that some surgeons occasionally had recourse to this operation. We already find even in F. de Hilden the rule to cut down upon them, and to draw them towards us and tie their pedicle deep down, before completely detaching them from the body. It would be abusing the patience of the reader to say now that we should proceed in the same manner for scirrhus, colloid, encephaloid, melanotic, fibrous, fungous, or any other form of tumors other than those that are lymphatic. The only point which it is important not to lose sight of under such circumstances, is this, that we should not undertake the extirpation of *malignant* tumors, if the least particle of them is to escape from the action of the bistoury or the ligature in mass; while tumors purely ganglionic or tuberculous, may be extirpated with considerable chances of success, even though we are forced to abandon some of the engorged ganglions in the axilla or above it.

#### § IV.—*Lymphatic Tumors of the Neck.*

There exists in the neck so great a number of lymphatic ganglions, and these ganglions are distributed upon so many different points, that it is scarcely possible to study their extirpation separately in all the situations in which they sometimes give rise to the formation of abnormal tumors. It has happened to me on two or three occasions to extirpate them where they were situated behind the sterno-cleido-mastoid muscle, and seemed to repose upon the outer side of the trapezius. In that position we may lay them bare freely by a simple incision, directed from above downwards or a little obliquely. As in this region there is no important organ to avoid, we may, after the incision of the integuments is made, and the tumor is properly secured with the hook, proceed with free and rapid strokes of the bistoury. From the natural tension of the parts rendering it almost impossible to keep in perfect contact the walls of the cavity which results from this operation, we have the reason why immediate reunion scarcely ever takes place, and that it is more prudent in fact to dress flatwise and with small balls of lint, rather than by the exact approximation of the parts. If, as I have seen in two or three cases, the tumor, which was in all situated behind the sterno-mastoid muscle, should occupy the upper third of the neck or the neighborhood of the occipito-mastoid region, we might proceed otherwise, and treat the division of the integuments as an ordinary simple wound. Between the os hyoides and thyroid cartilage, where lymphatic tumors of the neck are sometimes developed; between the sternum and the thyroid gland, where they have also been met with in some patients, they should be treated as will be mentioned in the article upon operations which are performed upon the neck. But it is necessary to consider the extirpation of lymphatic tumors separately, in the parotid, sub-maxillary, carotid and supra-clavicular regions.

A. *Parotid Tumors.*—Having to treat elsewhere of the removal of the parotid itself, when this gland is degenerated, I could only repeat here the details into which I shall then be obliged to enter,—(see *Extirpation of the Parotid*, infra.) I will say only in anticipation that those tumors formed by the parotid gland of which so much has been said, have all of them, or almost all of them, for their basis or point of departure the lymphatic ganglions properly so called. It is from having frequently ascertained the truth of this position that I take the liberty at the present time to affirm it positively.

B. *Sub-maxillary Tumors.*—The sub-maxillary tumors that are most common, are observed in the mylo-hyoid space; but they are met with also directly under the chin, quite frequently under the angle of the jaw, and sometimes also upon the external face of this bone in front of the masseter muscle. In a young girl aged ten years, who had one of the size of a large nut under the chin, I made an incision, which being carried from the symphysis of the jaw to the level of the os hyoides, while the head of the child was held back by an assistant, enabled me to hook fast, dissect out and completely extirpate the tumor with ease. The wound which was united by first intention by means of a band of adhesive plaster passed under the jaw in the

form of a bridle, was completely closed up in less than fifteen days. In another patient who had one of them on each side the median line, it became necessary to make two such incisions. As these tumors were in part softened and as they left quite an irregular cavity, I deemed it advisable to dress them with small balls of lint and to treat them by secondary reunion; the cure nevertheless was completed at the end of three weeks. The lymphatic tumors which at this part are sometimes sub-cutaneous, at least situated in front of the muscles, are not approached by any large sized artery. The sub-mental is the only one that may be wounded and require a ligature. Nevertheless there sometimes exudes from the wound a sufficiently considerable amount of blood to oblige us to give the preference to tamponing to dressing simply with adhesive plaster. Under the angle of the jaw the ganglions may acquire the size of a nut, egg or fist. Being in that part situated outside of the digastric muscle, and sub-maxillary gland, and in front of the sterno-mastoid muscle, they approach sufficiently near the internal jugular and the carotid arteries to create some little apprehension in those who should desire to attempt their extirpation. Nevertheless I have frequently removed them and always found that the operation was simple and sufficiently easy. For that purpose, the patient being inclined a little towards the sound side, and having the chin slightly raised up, should be kept in this position by assistants, who should at the same time depress his shoulder upon the diseased side. Should the tumor be of medium size, I lay it bare by means of a curved incision, modelled in some measure upon the curvature of the sub-maxillary region. If the lymphatic mass is of a certain volume, I give to this incision a very decided semilunar form, in order to obtain a flap which may be raised upon the side of the jaw from below upwards and from behind forwards. Having then seized the tumor with a hook, which an assistant is charged with making traction upon in the proper direction, I proceed to the dissection. The finger holds apart and stretches the lamellæ in proportion as the instrument divides them, and when we reach near the deep-seated parts, completes the enucleation should there be any organ there which ought not to be exposed to the point of the bistoury. Whether the wound forms a semilunar flap or a simple curved incision, it ought not to be completely closed except in extremely simple cases. In the aggregate we are exposed to fewer inconveniences when we treat it by gentle tamponing, than when we endeavor to unite by first intention. The tumors on the outer side of the jaw however are sufficiently rare. I have removed some which were situated exactly upon the track of the facial artery. There can be no positive rule for the direction of the incisions in such cases, and the great diameter of the tumor must serve as our guide for their location. We must be prepared moreover to wound the external maxillary artery, inasmuch as it is often enveloped as it were by the ganglions which we have to extirpate; but this vessel is not of sufficient importance to create the least uneasiness, and the surgeon has only need of recollecting that it is generally advisable to tie or twist both its lower and upper end, in consequence of the reflux which takes place from the coronary arteries or the angular artery. The wound here being on a fixed plane might be closed by primitive agglutination, if it

were found in other respects under conditions which would authorize our undertaking this kind of union with reasonable chances of success.

C. *Mylo-Hyoid Tumors.*—The triangular space bounded on the inner side by the mylo-hyoid or the hypo-glossus muscle, outwards and upwards by the inner face of the jaw, and outwards and downwards by the supra-hyoid aponeurosis and the platysma myoides muscle, and in which space is situated the sub-maxillary gland, also includes a variable number of lymphatic ganglions, which frequently become diseased, and sometimes enlarge to such extent as to acquire the volume of an egg or greater. These tumors becoming developed in consequence of diseases of the face or anterior region of the cranium, or of the interior of the mouth or of the gums, frequently exist under the character of a local affection in persons, who in other respects, are in the enjoyment of good health, and who have no other kind of lymphatic engorgement. It is in such cases that I have most frequently practised extirpation of the glands of the neck, and where the operation succeeds the best. In addition to the examples which I have elsewhere published, I could at the present time add a great number of others. The tumors of which I speak are globulous, generally ovoid, movable, hard or elastic, and exceedingly prominent below the jaw. In pressing them at the same time through the mouth and at the supra-hyoid region, one would suppose that they were isolated (*à nu*) under the mucous membrane and under the skin. But this appearance should not deceive us. Lymphatic tumors of the sub-maxillary region, are necessarily sub-aponeurotic, and the surgeon must expect to search deeply for them, if he expects to remove every part that is diseased. As for the rest, provided their surface has not undergone any degenerescence, is not ulcerated, nor has contracted any unnatural adhesion with the surrounding tissues, the removal of the larger sized ones is not essentially more difficult or dangerous than that of the smaller.

I. The *operative process*, moreover, is sufficiently simple; and the incision of the integuments may be performed in three ways. 1. An incision parallel to the lower border of the jaw or to the great diameter of the tumor, ordinarily suffices; only that it is advisable to place it sufficiently low down, in order that after the operation it may not be drawn towards the base of the bone. The wound being thus reduced to a simple slit, leaves only a linear cicatrix, which is naturally concealed under the jaw, and is scarcely perceptible.

II. If the straight incision should not give sufficient freedom, as happens when the tumor exceeds in volume a large sized pullet's egg, a vertical incision upon the lower lip of the first wound, would procure a division in T, with two lower flaps, which should be dissected and reversed, one to the front and the other backwards.

III. In this case I would still give the preference to the curved incision and semilunar flap, over the T incision. This flap, raised up from the neighborhood of the os hyoides to the face, would enable us to lay bare the entire cutaneous surface of the tumor, and would afterwards fall by its own weight over the cavity of the wound. In whatever way we proceed, the patient being placed upon the bed and inclined as has been described above, should have the chin raised and

the head thrown backward. The incision of the integuments should be made boldly and as far as to the most projecting point of the tumor. Its anterior angle may be prolonged without apprehension of wounding any important artery. But posteriorly it is not the same; there it may be possible that the facial vein, or even the external maxillary vein has been raised up by the lymphatic tumor and rendered more superficial than usual. Most frequently, however, these vessels are situated rather behind and on the inner side of the posterior extremity of the tumor. It is sufficient to say that in these cases, the dissection of the parts should commence from above, or from below, or at the anterior half of the degenerated ganglions. Being secured and drawn forwards and outwards by means of an erigene; these tumors are afterwards disengaged from the bottom of the mylohyoid fossa by means of the finger or the handle of the scalpel, as much as by the cuts of the bistoury. If the facial artery should, as frequently happens, be wounded, there is no cause to be greatly alarmed. The ligature is to be applied immediately, or what is as well, it is to be temporarily closed by the finger of an assistant. Were we not prepared for this, we might in fact, in a great number of instances, suppose that we had opened it, when it is the secondary branches only which enter into the tumor at the apex of the ganglions, that have been divided. The disease sometimes produces such enlargement in these branches that we not unfrequently find them to have acquired the dimensions of a crow's quill, and throwing out blood with violence at the moment that they are divided by the bistoury. We may while dissecting out these tumors be compelled to penetrate as far posteriorly as the sides of the larynx and in front of the carotid arteries. I have frequently seen pulsating naked before the eyes of the operator, and at the bottom of the cavity previously occupied by the tumor, the lingual artery on the inner side, the internal carotid behind, and the external maxillary without. This cavity which at first has something frightful in appearance and which could easily contain the fist, may be prolonged also as far as the median line in front and the os hyoides below. M. P. Eve (*Southern Medical and Surgical Journal*, January, 1838; and *Gaz. Med.*, 1838, p. 17) penetrated in this manner as far as the outer side of the tonsil to remove a tumor of half a pound in weight, and cured his patient. I assisted M. Vidal in a young man in whom he removed three degenerated ganglions which occupied one entire side of the supra-hyoid region. Unless the tumor be uniform and small in size we must not attempt to close this cavity by first intention. Tamponing and the mode by second intention, offer an infinite deal more of security and without materially retarding the cure. It is to be recollect, only that after the first eight or ten days, that is, when the balls of lint become no longer of any use, the upper lip of the wound, drawn upon as it is by the border of the jaw, has such tendency to be raised up towards the face, as to require some preventions. It is then that a strip of adhesive plaster, placed on the outside of and along the lower border of the jaw, serves to retain it and crowd it downwards and prevent its retroversion (renversement). This strip would become still more advisable, if in place of the usual incision, we had employed the semilunar flap to lay bare the tumor.

By this kind of primitive secondary union we are protected from erysipelas and purulent collections, while we produce notwithstanding, in the space of fifteen days to a month, a perfect cure, with a cicatrix nearly linear. This mode of extirpation, for which no person had given the process when I pointed it out in the year 1825, has now been performed a great number of times successfully by M. Bégin at Strasbourg, (*Malle Arch. Méd. de Strasbourg*, 1836,) by M. Sébillot, (*La Presse Méd.*, t. I., p. 139,) and by M. H. Larrey at the Hospital of Val-de-Grâce. For myself, there is not a year, that I have not had recourse to it, on from ten to fifteen patients; and I have not seen up to the present time any operation whose consequences are less serious. Every thing goes to show that in this region, the introduction of air into the veins is not to be apprehended, notwithstanding some facts which have been related in favor of a contrary opinion. Unless therefore there should be some particular complication or counter-indication connected with the general constitution of the patient, the extirpation of lymphatic tumors from the submaxillary region, should be recognized in practice as a systematized operation of surgery.

D. *Tumors of the Carotid Region.*—After the mylo-hyoid depression and the carotid region, the sterno-carotid groove is that on which lymphatic tumors are the most frequently met with. The chain of ganglions which occupy this groove, is composed of such numerous glandules (grains) that they are noticed on every part of its length from the supra-sternal fossa to the angle of the jaw. They are distributed, moreover, in such a manner, that some repose directly upon the anterior surface of the vessels, while others lie entirely concealed, either by the internal surface or by the posterior border of the sterno-cleido-mastoid muscle. I have, however, never found them to be absolutely superficial, though I have sometimes met with them all around the carotid artery or jugular vein, while others were at the same time prolonged under the posterior surface of the pharynx or œsophagus. If in this region the tumors are numerous, deep-seated, and but little prominent, or should raise up the sterno-mastoid muscle, in place of projecting towards the side of the neck or larynx, it is better not to meddle with them, or to attack them only with general remedies and local applications. If, on the contrary, they present themselves under the form of one or more movable lumps, (bosselures,) making a projection between the sterno-mastoid muscle and the middle of the neck, and if their totality constitutes a mass, independent of the thyroid body, the carotid artery, or jugular vein, without having any prolongation in the direction of the chest, it is allowable and practicable to undertake their extirpation. Upon the supposition that the tumor situated transversely, and strangulated by the sterno-mastoid muscle should be bilobate, in such manner as to present one of its halves posteriorly, and the other in front, there would still be ground to attempt its removal, should the uniting bridle, in other respects, be so thin as to allow of our avoiding the neighboring vessels and nerves. To perform the operation, the patient is to be placed upon his back, taking care that his head is raised sufficiently high upwards. In this position the sterno-mastoid muscle being stretched and thrown backwards, pushes the tumor forward, and in this manner

renders it more superficial, while at the same time it gives it a greater degree of fixity. The surgeon making his incision from above downwards, divides the integuments to an extent which should exceed the limits of the tumor by nearly an inch. As soon as the front part of the tumor is laid bare, he detaches the lips of the wound upon the outer and then upon the inner side. It is at this moment that he hooks his erigine into it, in order that an assistant may secure it, and hold it aside while the dissection is being proceeded with. This dissection has nothing about it particularly difficult until we arrive near the bottom of the carotid region; but setting out from there, the finger should always precede the point of the bistoury, and no lamella of tissue ought to be cut without having been previously stretched by means of the forefinger. By inclining the extremity of the instrument towards the ganglionic surface, we avoid with certainty all the large vessels which are situated behind. I have, moreover by adopting the mode of enucleation, several times succeeded in detaching some more deeply situated lobules, which were entangled behind the jugular vein, or carotid artery, and sometimes between those two vessels. It is, moreover, a matter of little importance, whether the deep-seated surface of the tumor should be isolated from above downwards, or from below upwards. We must be prepared to find by this operation, as has happened to me in quite a great number of cases, that we have extensively denuded the carotid artery, the internal jugular vein, the pneumo-gastric nerve, and the great sympathetic. It suffices to remark that these organs might be interfered with, and that we must be on our guard against wounding them. [See case in our Vol. II, under the head of the *nerves*, in which the pneumo-gastric imbedded in a tumor recently removed by Dr. McClellan, of Philadelphia, had to be completely divided, which, however, did not interfere with the restoration of the patient. T.] It was in a case of this kind that M. Fouilloy (*Ansiaux, Clin. Chir.*, p. 238, 2d edit.) was compelled to tie the carotid artery. There is every reason to believe also, that the tumor successfully extirpated by M. Voisin, (*Gaz. Med.*, 1835, p. 447,) and which obliged him to dissect upon the carotid, was one of the class of those of which I am speaking. We may conceive also, that an opening into the internal jugular vein, would in this part endanger to a greater degree than in most other regions of the body, the introduction of air into the heart, and the fearful accidents which are the consequence of it. In a young man in whom I had removed one of these tumors on the right side of the larynx, there was heard at the moment of my dividing one of the anterior veins of this region, near the jugular, a hissing and gurgling sound, which at first gave me great uneasiness, the more so from the patient uttering a piercing cry that he was dead! There followed, however, no serious symptom, and the consequences of the operation were exceedingly simple. I have already stated (see Vol. I.) that a woman in whom I had been obliged to penetrate as far as to the posterior surface of the pharynx, was seized to an extreme degree with the symptoms which indicate the entrance of air into the veins, at the moment when I had wounded the upper part of the internal jugular. Without asserting that these facts are very conclusive in respect to the

entrance of air into the venous system, it is proper, nevertheless, that we should not forget them, and that we should reflect upon the circumstances which may produce them, when we have decided upon the extirpation of lymphatic tumors in the carotid region. When some of the lobules of the tumor are situated at, and project towards the posterior border of the sterno-mastoid muscle, it is not uncommon to see them have a tendency to move forwards, and conceal themselves to a certain extent under the muscle, in proportion as we extirpate the anterior lobes. Their removal also, greatly embarrasses the operation, and admits of the question, whether it would not be more advisable to attack them separately, by means of an incision, independent of the first, and before commencing the other part of the operation. Having in one case adopted this plan, I found that the rest of the tumor, thus liberated from all kind of adhesion posteriorly, advanced freely forward, and yielded readily to the tractions that it was afterwards necessary to make upon it. In case of still greater complication, as for example, where besides these two lobes, anterior or posterior, the tumor should be exceedingly thick at its neck, I would not hesitate in order to lay it bare, to divide the sterno-mastoid muscle, and in such manner as to transform the entire wound into a large T incision, whose stem should be placed transversely. Here also, more than in the sub-maxillary region, the dressing by second intention should have the preference over immediate reunion. The lamellar character of the tissues, the natural and unavoidable mobility of many of them, and the great number, or the importance of the vessels which have suffered, do not allow in such cases of our counting upon a free primitive agglutination; and the danger of purulent abscesses in the direction of the chest, either above or below, is too formidable to incur this risk by attempting to shut up the wound by first intention.

E. *Supra-Clavicular Tumors.*—The hollow, or species of cavity which is noticed above the clavicle, also contains lymphatic glands, whose degeneration is not uncommon, and which come under the same considerations of pathology, therapeutics and operative surgery, as the preceding. Nor should I, as they are surrounded with numerous or important vessels and nerves, any more recommend their extirpation to be undertaken unless in a case of necessity; the more so, as it is often difficult to ascertain in the beginning, whether they are continuous or not, by chains of the same nature as far as the axilla, or in the direction of the chest. A young lady who had one of these tumors upon the front, and outside of the scalenus anticus muscle, was desirous of getting rid of it. Before being enabled to complete its removal, the surgeon, a celebrated practitioner at Paris, found that it made a prolongation inwards, and that there was a similar one in front of the carotid vessels. In his attempt to extirpate this last, he opened extensively into the internal jugular vein, near its junction with the subclavian. A copious hemorrhage followed: the operation, nevertheless, was finished, but symptoms of purulent infection, or phlebitis, soon made their appearance, and the unfortunate lady perished on the eighth or ninth day, causing to her afflicted relative who was a physician, and greatly attached to her, the most poignant regrets. I would, therefore, not extirpate lymphatic tumors in the

supra-clavicular region, unless they were perfectly movable, isolated, and without any ramification towards the anterior region of the neck, or towards the axilla or thorax. Another reason which would prevent me from interfering with them except under these circumstances, is this, that if the introduction of air into the veins is really dangerous any where, it ought to be so in the supra-clavicular region more than any where else. Up to the present time, I have performed this operation only upon five patients. In three of them the tumor, which did not exceed in volume a large nut or small egg, was so well isolated and movable that there was no serious difficulty to be surmounted. The two others had each a ganglionic mass, which was prolonged as far as the brachial plexus, and subclavian vessels. This dissection was tedious, but no accident supervened, and the cure was completely established. The patient should have the chin slightly raised up, the head inclined towards the sound side, and turned back, and the shoulder of the diseased side depressed, and also directed backwards. The surgeon placed on the same side, makes an incision parallel to the clavicle if the tumor exceeds the volume of an egg; and in the contrary case, parallel to the axis of the body. In whatever way made, this incision should be of sufficient extent not to embarrass the consecutive steps of the operation. Supposing after the first incision we should be under the necessity of making another, we would then freely divide the upper lip of the wound in the first case, and the outer or posterior lip in the other. Perhaps, also, it would be more advisable, in lieu of these different modifications of the ordinary incision, to substitute a large semilunar flap, taking care to turn its free border outwards and downwards. The integuments being now held aside or turned back, the surgeon seizes the tumor with the erigene, and hands it over to an intelligent assistant, that he may raise up or incline the diseased mass according as it may be required during the remainder of the operation. The dissection is also to be performed after the same rules as in the preceding regions. It is better in commencing, to do this from above, then outwardly, than to begin on its inner border or inferior portion, since the internal jugular or subclavian vein lies on one or the other side of it.. Having arrived at its deep-seated surface, we should isolate it after the same rules (*dans le même sens*), and here still more than in any other region, would there be occasion for strangulating its root completely below it, if it should appear to be too hazardous to detach it up to its termination by means of the point of the bistoury, and that the finger would not suffice for enucleating it. This operation, which is ordinarily very painful, in consequence of the numerous branches of the cervical plexus, which are dispersed throughout the whole extent of the supra-clavicular region, compels us also, in most cases, to divide the external jugular vein; but this vessel is of too little importance to make us hesitate about sacrificing it. I would not hesitate, then, to divide it in the beginning, and afterwards to tie its upper end and even its lower, if I thought it could cause the least inconvenience. We should have to respect, also, and to tie them should they be divided, the transverse cervical artery, the supra-scapular, the ascending cervical, and even the inferior thyroid. As to the dressing, I would regard it as exceedingly imprudent to wish to run the

risk of union by the first intention. In whatever way we may proceed, the internal surface of the flaps or lips of the wound cannot be applied with the required accuracy against the bottom of the solution of continuity. Suppuration being thus rendered unavoidable, and having no issue, would expose to the risk of purulent abscesses and diffused inflammations, of which it would be difficult to arrest the progress or avert the danger. The flat dressing by means of pliant balls of lint, perforated linen and plumasseaux, secures us from these apprehensions, and does not perceptibly retard the definitive cicatrization of the wound.

Can it be necessary now to add, that lymphatic tumors may be developed everywhere, where there naturally exist ganglions of the same name, and that everywhere also it would be advisable to attack them by conforming ourselves to the rules established in the preceding paragraphs? Until practice shall have acquired a certain extension on this point, it would be useless, as I consider, after having laid down the general rules, to detain ourselves with the projection (superposition) and description of special processes.

[*Lymphatic Tumors* or *Lymphatic Cysts*, those in fact called by the French *cold abscesses* (*abcès froids*), have been treated successfully by Dr. G. Capelletti, of Trieste, (*Giornale per servire, &c.*, January, 1842; *Arch. Gén. de Paris*, 4e ser., t. III., p. 346-347.) by means of injections of nitrate of silver (2 to 3 grammes of the nitrate to 500 grammes of water); injecting through punctures first made in various places by the trochar in order first to evacuate the contents of the tumor. The tumor is to be filled with the injection, and the action of the latter aided by uniform and continued pressure.

One of the most remarkable and mysterious cases of a *general hypertrophied condition of all the lymphatic glands* on the external sub-cutaneous regions of the body in an adult woman from one of the provinces of France, aged 38 and otherwise perfectly healthy, occurred to the excellent author of this work, M. Velpeau, in his own service at the Hospital of *La Charité*, at Paris, during the year 1845. These enlarged glands in the only account of them we have yet met with (*Annales de Thérapeutique*, Paris, April, 1845, in Cormack's *Lon. & Edinb. Month. Journ.*, June, 1845, p. 459.) are, it is stated, found in this woman in masses, as it were, or strung in chaplets varying from the size of an almond to a hen's egg, in every region externally where such glands exist, viz.: in the axilla, groins, neck, elbows, legs and trunk. They roll under the finger, are without pain or change of color on their surface. They appeared almost two years before without any appreciable cause. The woman had previously enjoyed excellent health; she is even now robust and suffers nowhere, except that the tongue is a little white, and the digestive organs are occasionally out of order. She says she has lost flesh, but she is still rather stout; the skin has a slightly yellowish tint, but not approaching to icterus; she has perspired copiously through the night for some time past. No one of her family, so far as she knows, has been affected in a similar way, and none of the inhabitants of the country where she resides have any thing similar. Her place of residence is well aired, and from her occupation she

passed most of her time in the open fields. M. Velpeau retained her in his ward as a subject of study ; she was put on the extract of walnuts for nearly two months, but no favorable change occurred ; the health of the patient seeming rather to decline. This case seems to call in question the pathological accuracy of the opinion that the enlargement of the sub-cutaneous glands is necessarily connected with a scrofulous temperament, and the evolution of which temperament, so far as these glands are implicated, generally takes place in the early period of childhood. In this woman nothing is found but general hypertrophy of the glands ; the serous membranes are in a good state, the osseous system exhibits no alteration, and there are no knotty cords in the course of the lymphatic vessels, as is the case in some kinds of erysipelas. It may be termed a sort of general *ganglionitis* ; but it does not follow that it is true scrofula, since there are none of its constitutional symptoms. Nor is there any thing of cancer in this case, though this affection is by some thought to have its origin in chronic lymphitis. T.]

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## CHAPTER IV.

### NEUROMATIC TUMORS (Neûromes).

Pathologists have frequently mentioned small tumors, usually subcutaneous, the distinguishing feature of which is that of causing from time to time, and upon the slightest occasion, painful irradiations excessively acute, which yield to no remedy and are a source of torment to the patients. These tumors, which many persons have located in the nerves, with which however they must be disconnected, if Dupuytren and M. Wood (*Trans. Med. Chir. of Edinburgh*, vol. III., p. 317), which M. Jaumes (*Thèse* No. 266, Paris, 1828), ranges among cancers, that Boyer was desirous of considering as scirrhouς, which are bodies *sui generis*, according to some others, and upon which MM. Arronshon (*Thèse*, Strasbourg, 1822), Clerambeault (*Obs. de Méd et de Chir.*, 1829), Wood, Descot (*Affections locales des nerfs*, 1825, p. 208 to p. 286), and Alexandre (*De tumor nerv.*, etc., Leyden, 1810), have published interesting observations, are much more common than would be imagined according to classical authors. Not having to decide in this place what may be their real character, I will confine myself to saying that for the most part they have been found on the track or in the substance itself of the nervous cords, and that they have sometimes presented themselves to me with the characters of tuberculous masses, and at others under the aspect of tumors that were truly scirrhouς or encephaloid in the crude state ; while in other cases it would have been utterly impossible for me to have compared them to any other morbid production or degenerate tissue. It is incorrect to assert with Descot (*Op. cit.*, p. 208,) that their size varies from that of a grain of wheat to that of a bean ; for I have met with some whose dimensions exceeded that of the fist, and we shall see farther on that other observers

have met with similar examples. It would be more correct to say that their volume varies from that of a grain of wheat to that of the head of a new-born infant. Descot, in his work (*Ibid.* p. 209,) which was prepared in great part under the dictation of Béclard, commits another error in saying that these tumors are scarcely ever multiplied. M. Wood, in fact, speaks of a patient who had three of them. Siebold had two of them above the instep, and I counted *nineteen* upon the same patient at the hospital of La Charité, in 1836. In giving to these tumors the name of *ganglions*, under which Hippocrates and Galen appear to have designated them, and in the attempt to distinguish them under the name of *nodatio* from tumors called *nodus*, Jean de Vigo has but attempted a futile division; but at the present time not having it in our power to adopt any name to the exclusion of others, they are still designated under the title of knots ( *noeuds*) after Parè; *painful sub-cutaneous tumors* as they are called by the English practitioners especially; or *neuromata* (neuromes), or *chondromata* (chondromes), which is the epithet used by Odier, and which has been generally sanctioned by the French pathologists. The accidents they cause, the excruciating (atroces) pains they excite, and their usual resistance to every kind of remedy, induce most patients affected with these tumors to demand of themselves to be relieved from them by extirpation. It is in fact the only efficacious means that surgery has to oppose to them. No doubt that by attacking them with caustic as Siebold the father did upon Siebold the son (Alexandre, *Op. cit.*, p. 21) we may also sometimes succeed in curing them; but the operation by this mode would be longer, less certain and in reality manifestly more painful. Amputation of the part, which Louis (*Encyclop. Méthod.*, partie Chir. t. II., p. 442), Odier (*Manuel de Méd. Prat.* cité à l'art. *Excision des Nerfs*), and M. Warren (*on Tumors*, etc., p. 62), are still in the practice of, would not be justifiable at the present time, unless by means of its degeneration the tumor had effected a profound alteration in the limb. As to extirpation, it would always be easy and simple, if it were true, as the title of *sub-cutaneous tumors* would seem to indicate, that *neuromas* were always found immediately underneath the skin; but observation has now shown that the deep-seated nerves as well as the superficial, become the seat of these tumors. It follows from this that the removal of neuromas may sometimes become a serious operation. They have moreover been encountered upon almost every region of the body. Franco (*Traité des Hernies*, p. 484.) speaks of a woman who carried one for ten years upon the tibia. Another woman, mentioned by Loyseau (*Obs. de Méd. et de Chir.*, p. 56.) had one upon the inner part of the thigh, and the same practitioner met with one in another woman upon the outer part of the same limb. Whether the small nodule removed by Pouteau (*Oeuvres Posth.*, t. I., p. 5.) was or was not a neuroma rather than a simple inodular induration, it was found nevertheless, in front of the malleolus at the place where the saphena is opened in bleeding of the foot. M. A. Petit (*Discours sur la douleur*, p. 15, an VII.) also relates that he had met with them almost exclusively upon the legs, though he had seen one also upon the fore-arm. In the case mentioned by Valsalva, as related by Morgagni, (*De sedibus et*

*causis morb.*, epist. 50,) the tumor was situated upon the malleolus. In the case of Cheselden, (*Anat. of the Human Body*, p. 256, tab. 28, fig 7,) it was seated in the ulnar nerve. Petit (*Mém. de l'Acad. de Chir.*, t. I., p. 90,) mentions another in which it existed upon the arm. In one of the female patients of Camper (*Demonstr. Anat. Path.*, lib. I., cap. 2.) it was upon the outside of the elbow; and in another woman mentioned by the same author, upon the front part of the knee. The patient amputated by M. Warren (*on Tumors, &c.*, p. 60) had one upon the tibia below the knee. The tumor spoken of by E. Home, (*Trans. for the Improvement of Med. and Chir. Knowledge*, vol. II., p. 92,) and which was removed by Hunter, was also situated upon the arm: and in the patient of E. Home himself, the tumor had to be seized in the hollow of the axilla. A. Dubois, (*Spangenberg, Archives de Hom.*, t. V., p. 306,) in one case saw the neuroma in the neighborhood of the patella, and on the middle of the arm in another. The tumor dissected by Hasselbach (*Alexandre*, p. 22) occupied the ulnar nerve, and that of Siebold (*Ibid.* p. 21) the space between the two malleoli. Neumann (see Siebold, t. I., p. 54) encountered one on the lower and middle part of the fore-arm. One of the patients of Rieche, (*Alexandre, op. cit.*.) had the tumor on the inner part of the arm, and the other outside of the condyle of the humerus. M. A. Cooper (*Trans. Med. of Edinburgh*, vol. III., p. 640,) and M. Warren (*on Tumors*, p. 63,) have met with them in the breast or below it. Nicod (*Descot, op. cit.*, p. 244,) mentions to have seen them on the chest, and M. Marjolin (*Ibid.*, p. 245,) on the scrotum. In the patient of Short, (*Obs. de Méd.* t. IV., art. 27,) the tumor was situated upon the thigh; while M. Warren, (*on Tumors, &c.*, p. 63,) saw one in a boy of sixteen years, below the great trochanter. With respect to myself, I have met with them on the sole of the foot, on the outer side and inner side of the leg, in front and on the inner and outer side of the thigh, twice even in the depth of this limb, on the right and left side of the thorax in two different women, on the right portion of the epigastrum, near the wrist, and on many points of the fore-arm; in the body of the biceps muscle, on the track of the musculo-cutaneous nerve, and in the depth of the carotid region. What I have observed, and which is in accordance with what is related by authors, proves, in contradiction to what Descot (*op. cit.*, p. 210,) alleges, that these tumors are more frequent in adult or old age, than in children. One of the women whom I had an opportunity of examining was sixty years of age and upwards; another was 40, a third 36, and the youngest 21. The same has been the case with the men, who were 30, 40, and 50 years of age, and even older. If one of the patients of Reiche was only 19, the other was 44; those of Morgagni and Petit were young girls, and the cases of Camper, E. Home, and Louis were clearly women. Nor were those of Dubois and Hasselbach young subjects, while the case of Neumann was 60 years of age. These details prove moreover, that if M. Wood has met with neuroma in women only, this must be ascribed to accident only, since numbers of men have also been affected by it. We must add that cases of neuroma have been noticed also by Bicet, Pearson, Broon, Newbigging, Swan, Hall, Windsor, Laing, Walker, Hey,

Simson, Gooch, Jacopi, Monteggia, Craigie, Mojon, Capel, De Haen, Leduc, J. Bell, W. Blizzard, Marandet, Beauchêne, Richerand, and some others, all of which have been collected by M. Wood in his Memoir (pages 324, 326, 329, 330, 334, 345, 350, 353, 354, 390); and by Descot in his Monography (pages 252, 253, et seq.) As to the efficacy of extirpation in neuromas, it is no longer at the present day allowable to call it in question. The woman operated upon by Franco had been for ten years in a perpetual torment. The tumor, which was of the size of a small nut, had scarcely been removed, when the suffering ceased forever. In the two examples cited by Loyseau, the pain, which became excessive as soon as the patients began to get warm in bed, also disappeared immediately after the operation, which the surgeon believed he could render more effectual by afterwards cauterizing the wound. The same result was obtained by Pouteau, though in the case mentioned by this practitioner, the pains were so excessive as to occasion convulsions in the left side. One of the most curious facts of this kind is that of Short. In fact, though epilepsy appears to have sometimes originated from some small tumor of this nature, or from a nervous cicatrix, and that Lassus has been enabled to cite Hippocrates, Galen, Celsus, and Alexander of Tralles in support of this, we find in none of these authors an example so conclusive as that of the English Physician. A woman affected with epilepsy for twelve years had up to that time had the paroxysms only once a month; but they now began to appear four or five times a day, and to continue for an hour or an hour and a half. As they began always with a pain at the lower and inner side of the calf, Short examined the leg of the patient during one of these paroxysms. Plunging in a scalpel to about two inches in depth, he felt a small body which he separated from the muscles and excised. It was a hard cartilaginous mass, or sort of ganglion, of the size of a pea, situated upon a nerve which the surgeon divided with the same stroke of the instrument. The patient, who was immediately relieved of her paroxysm, cried out that she was perfectly well, and never had an attack afterwards. The young girl mentioned by Morgagni, and in whom the pains were so acute that she would have cut off her foot herself had she not been prevented, was also very speedily cured by the removal of the tumor. The same occurred in the case of Petit, who also speaks of the intolerable pains. In the patient of Cheselden, who experienced a numbness only at certain times, but suffered acute pains upon the least shock, the operation was no less fortunate; as it was also in the two women operated upon by Camper, the one treated by Hunter; and the patients of Dubois, Siebold, M. Reiche, &c. Surgeons of the present day, therefore, who would decline an operation of this kind, would be censurable. There is every reason to believe for example, that a patient who after an amputation of the thigh, continued for two years to suffer the most excruciating pains, which he referred to the extremity of his foot, might have been relieved of his misery, if the species of swelling or tumor which had formed above a portion of a branch of the sciatic nerve which had been included in the ligature of the vessels, could have possibly been extirpated. (Portal, *Anat. Méd.*, t. IV., p. 289.) The case, mentioned by Portal, who

states that he saw the specimen at Montpellier in the museum of Lamorier, reminds me of an observation: those nervous sympathetic pains, which occasionally persist for so long a time, and which many who have been amputated refer to limbs which they no longer have—are they not imputable to the fact that nervous filaments have in reality been included in the ligature with the vessels? [See remarks on this subject in Vol. I., under *Bleeding*; and Vol. II., under *Nerves*.]

#### ARTICLE I.—EXTIRPATION OF NEUROMAS IN GENERAL.

Neuromatic tumors, in relation to their cure by extirpation, present three varieties. Some are situated between the aponeuroses and the integuments, and others are found under the aponeuroses at a depth which ordinarily corresponds with the track of the nerves. If there are some which seem to be continuous with the nervous cords, there are others which appear to have no kind of connection with this description of organs.

##### § I.—*Sub-Cutaneous Neuromas.*

Whether they be continuous or not with the nervous branches, sub-cutaneous neuromas should, nevertheless, be extirpated nearly in the same manner in all cases. An incision of sufficient length is first made upon a line with the tumor itself. After having thus divided the skin and cellular tissue, the surgeon secures the tumor with an erigene and causes it to be raised up by an assistant while he isolates its sides. With a stroke of the bistoury or scissors, he then immediately after detaches its upper portion, then the deep-seated surface, and then its lower extremity. In this manner he annihilates with the first cut of his bistoury, by separating the nodule from its nervous centres, those painful irradiations sometimes insupportable, which he would otherwise occasion before having terminated the operation. Prudence would require that a layer of cellulo-adipose tissue of sufficient thickness should be removed with the neuroma. Unless the tumor should have acquired an extreme volume, that of a small melon for example, as in the patient amputated by Louis, or that of Ant. Dubois, the simple incision ought to be sufficient. A neuroma which should equal the size of a pullet's egg, as in the two cases reported by Reiche, would in almost all cases exact nothing more. As these tumors are usually sufficient regular, their dissection generally is easy. The tissues moreover by which they are surrounded, being in the normal state, are placed in excellent conditions for immediate reunion. It is on such occasions therefore, if ever, that we should approximate as accurately as possible the flaps or borders of the wound, and attempt the cure by first intention. Having a regular point d'appui or sort of barrier or protecting plane in the aponeuroses or bones which are found underneath the integuments, the surgeon experiences no difficulty in effecting the exact coaptation of the two opposite walls or lips of the solution of continuity. If, however, these tumors should have required, either in consequence of their volume, their degenerescence or some

anomaly in their form, the formation of numerous flaps, or a cavernous wound, we must proceed in the manner mentioned in the article on *Lymphatic tumors*. In other respects the wound which is made by the extirpation of sub-cutaneous neuromas, is a simple wound, and is to be considered in no other point of view.

### § II.—*Deep-seated Neuromas.*

Whenever it becomes necessary in order to reach the neuroma, to divide the aponeuroses, the operation becomes manifestly more serious. The limits of the tumor being less perfectly ascertained, do not enable us at first to regulate the extent of the incisions with all the precision desirable. To detach a sub-cutaneous neuroma we scarcely ever are in danger of wounding any important artery; some veins only can then embarrass the surgeon. In sub-aponeurotic neuromas, on the contrary, we have to guard against enormous vessels, and the same organs as in the case of lymphatic tumors. The incision of the integuments being made, we again endeavor by means of the finger carried to the bottom of the opening, to identify the exact position and size of the tumor, in order, without arresting the operation, to enlarge the external wound should it be deemed necessary. Dividing afterwards the aponeurosis with free cuts from without inwards, should there be neither large sized arteries, veins, or nerves in the neighborhood; but on the contrary, by puncture at first, and from within outwards, and on a grooved sound, when we have to proceed with caution; the surgeon then stops to examine anew the precise seat of the neuroma. While an assistant keeps the lips of the solution of continuity properly held apart, he continues to divide the tissues with care, and layer by layer, until the tumor is laid bare. He then secures it with a hook and causes it to be drawn upon by a second assistant, in order to facilitate him in isolating its two sides either by dissection or enucleation. Before separating it above or below, it is necessary to know if it belongs to a small or large nerve. In the first case, in fact, there is no necessity of our having recourse to a minute dissection in order to detach it, and to isolate it from the nervous filaments which surround it. We may without danger cut freely and completely through its two extremities, since the interruption of the functions of such nervous filaments, cannot create any very great degree of disturbance in the uses of the part which sustains them. If on the contrary the nerve is important and voluminous, we should endeavor, unless the thing should seem wholly impossible, to disengage it from the tumor and to dissect and isolate from it the filaments sometimes dispersed through it, (*éparpillées.*) and do every thing in fact to preserve its continuity while removing the neuroma. If, however, as has happened in a great number of cases, the nerve and the tumor are perfectly confounded together, we should decide upon removing the part degenerated, taking care to commence the section at the upper part of the tumor in order that the remainder of the operation may not be made more painful. In this manner it has been found practicable to remove one or two inches of the ulnar, radial or median nerve, without any very serious accidents, or permanent paralysis resulting therefrom. The

tumor being removed, whatever be the process, we must proceed to the ligature or torsion of the arteries, the arrestation of the hemorrhage by the known means, and the treatment of the wound in the manner described under operations in general; not forgetting that even under these circumstances the attempt at immediate reunion presents numerous chances of success. Nevertheless as we have here the supple and lamellar cellular tissue which separates the muscles, to transport inflammation and suppuration to distant points, we should not be too anxious for the immediate closure of the wound, when we find it impracticable to keep the different portions of it in the most exact coaptation possible.

## ARTICLE II.—EXTIRPATION OF NEUROMAS IN PARTICULAR.

### § I.—*Superficial Neuromas.*

Whatever be the region in which they exist, sub-cutaneous neurotic tumors are to be extirpated by a process which is the same every where, and for which the rules above given will be found sufficient.

A. *At the sole of the Foot.*—The limb being flexed and turned upon its outer side, I made an incision opposite the neuroma of an inch in length and parallel to the axis of the limb; having secured this tumor with an erigene, I glided underneath it the point of a straight bistoury, and readily separated it from the neighboring tissues, first behind and then in front. No arterial branch being opened, I was enabled to close the wound immediately, and to keep it thus united by a circular strip of adhesive plaster. The cure was accomplished at the end of a week.

B. *On the internal malleolus,* and on the whole antero-internal side of the leg we are to proceed, and would succeed in the same manner.

C. On the *knee* and in the neighborhood of the patella the limb should be extended or flexed, according as the tumor is more or less movable; but we must not turn it upon its outer side. After having laid bare and removed the tumor and united the wound, the limb should be placed also at the ham in a state of moderate flexion upon a pillow or large cushion.

D. For the anterior, inner, or outer side of the *thigh*, we should proceed in the same manner, without any necessity of more serious precautions after the operation. If the tumor was situated upon the outer or posterior region either of the leg or thigh, the surgeon would find some advantage in making his patient lie upon his belly. Nevertheless the incision of the skin, the excision of the neuroma, and the dressing, would be as in the preceding cases; and for the rest we should take care not to let the limb press upon the diseased region.

E. Neuromas of the *hand* or *fore-arm* are to be removed after the same rules. In all cases the limb should be placed so that the tumor should present itself in front of the operator, and in all cases also the wound could be united by means of strips of adhesive plaster or any other bandage. In the case of Neumann the tumor which had

existed for more than thirty years, was situated upon the lower and middle part of the fore-arm. After having divided the skin, it became necessary to tie several arterial branches, though the neuroma was only the size of a pea, and appeared to occupy a branch of the cutaneous nerve. It is difficult, however, to understand why Neumann was fearful of proceeding any farther, or that he should have thought it advisable to confine himself to narcotics and afterwards caustics to complete the operation. I have already said moreover, that the patient, who was seventy years of age, died of apoplexy before being cured of his wound. If, as in one of the cases of Camper, the neuroma should be situated outside of the elbow, and on the track of some of the branches of the musculo-cutaneous nerve, we should after having separated the limb from the trunk, keep it in a state of moderate extension during the whole course of the operation. It is important here that we should guard against the synovial capsule, and not penetrate deeper than is indispensably necessary in the direction of the articulation.

F. Upon the continuity of the arm, we should also have to turn the limb inwards or outwards upon its axis, according as the neuroma was placed more on one side than the other, and we should also have to guard against wounding the basilic or cephalic veins and the sub-aponeurotic organs. The thoracic limbs moreover, are those in which the dressing is most simple, and where the wound would have the best chance of cicatrizing by the first intention.

### § II.—*Deep-seated Neuromas.*

A. *The Thoracic Limbs.*—The extirpation of deep-seated neuro-matic tumors has already been performed upon a great number of different regions.

I. I do not know if it has been employed upon the fore-arm. In all such cases we should have to divide the integuments and isolate the tumor in this region, in the same way as for cutting down upon the radial, ulnar or median nerve. In the case of Cheselden it is clearly perceived that the tumor occupied the middle of the *ulnar nerve*; but it is not mentioned if it was in the arm or fore-arm. Having separated the muscles apart and isolated the tumor, it would be necessary to detach the nerve from the artery before completing its double section. The *median nerve* being nearly at an equal distance from the two principal arteries of this region, might, so far as regards any immediate danger in the manipulation, be excised with less apprehension.

II. In the *arm* the neuroma may occupy the radial, ulnar or median nerve, or the cutaneous nerves. a. E. Home says that the tumor extirpated by Hunter, in a woman aged 20 years, was situated upon the *musculo-cutaneous nerve*; having laid bare the neuroma by a proper incision, he excised about three inches of the nerve. The loss of sensibility, which at first showed itself in the thumb and forefinger, did not long continue, and the patient was completely re-established. A woman, upon whom I operated in 1838 at the hospital of La Charité, had at the middle of the left arm in the substance of the biceps, a small ovoid movable tumor with painful irradiations, which had existed for a great number of years, and produced the symptoms

which usually attend neuromas. Having separated the arm from the trunk, I made an incision of two inches between the lower extremity of the deltoid and the origin of the supinator longus muscle. Dividing the tissues, layer by layer, I arrived at the fibres of the biceps muscle without touching the cephalic vein, and then reached the tumor, which I secured with an erigene, and then excised. The acute pain which the woman experienced every time I touched this neuroma, the greyish looking stem which was prolonged above and below, and the numbness of the entire outer side of the fore-arm after the operation, sufficiently prove, as I think, that the tumor in reality occupied the trunk of the musculo-cutaneous nerve. The wound was united by first intention, and except for a diffused erysipelas which spread from an issue which the woman carried in her arm, the cure would have been completed at the expiration of a week.

b. Upon the large nervous trunks the operation might be much more dangerous. The neuroma of the size of a melon, which according to Dubois, occupied the *median nerve* of the right arm, required the crucial incision, and the excision of a considerable portion of the nerve. The cure was accomplished, but the sides of the fingers remained insensible. It does not appear that Petit was under the necessity of making use of a complex incision for the removal of that neuromatous tumor of the size of a pullet's egg, which had existed for seven years in the arm of a young girl. As it was suspended, according to the author, to a small nervous cord, we may consider that it was situated upon one of the cutaneous nerves.

c. In the first case of Reiche, it was evidently situated upon the ulnar nerve. The surgeon, after having taken up a fold of the integuments, divided them to the extent of five inches. The dissection of the tumor obliged him to divide many small branches of arteries, without, however, occasioning any serious hemorrhage. It became necessary to remove with it about four inches of the nerve. The pains, which were very violent at first, afterwards diminished and changed in their nature, and were soon followed by a numbness in the hand. The wound was cicatrized in fifteen days, and nothing ensued from the operation but a slight degree of insensibility in the little finger. We should operate here, therefore, in the same way as for cutting down to, and tying the brachial artery, with this difference, that we are guided by the tumor, and that while raising up this last during the dissection, it is generally easy to reach the nerve and to excise it, by commencing in the direction towards its root.

d. In the hollow of the axilla, neuromas may also have their seat over the aponeuroses. E. Home, who had to cut down upon one of this kind contiguous to the great axillary nerve, says, without designating the process he adopted, that he effected its excision, and that the operation caused neither any great degree of pain, nor any other unpleasant symptom as its immediate consequence; but he adds, that a violent inflammation soon supervened in the region occupied by the tumor, and that it occasioned the death of the patient on the eighth day. The arm in these cases must be held wide apart from the chest, and the tissues are to be divided after the rules laid down for a ligature upon the axillary artery, rather than after those for the extirpation of lymphatic tumors. Neuromas, in fact, will be found to

be resting against the root of the arm, instead of tending, like degenerate lymphatic ganglions, to glue themselves against the thoracic wall of the axilla. The best means of avoiding the misfortune mentioned by Home, in such cases, would be to dress the wound with small balls of lint, in place of immediately attempting its union by first intention.

B. *The Abdominal Limb.*—I. Every thing goes to show that there is no deep-seated nerve of the *leg* which is exempt from neuromas. Up to the present time, however, the extirpation of these tumors at the foot and upon the whole length of the abdominal member, has scarcely been spoken of except under the title of sub-cutaneous tumors. The case of Short is almost the only one which would appear to coincide with a profound neuroma. Here no doubt can exist, for the author says he plunged in his scalpel to the depth of about two inches, and that he was obliged to separate the tumor from the muscles before extracting it with the forceps. We should have to be guided, moreover, by the precise situation of the tumor and the known track of the nerves of this region.

II. It is not known whether the neuromas of the *knee* or in the neighborhood of the patella, extirpated by Camper and A. Dubois, were rather sub-aponeurotic than sub-cutaneous; but the natural arrangement of the tissues of this region, induces rather to the opinion that they were in reality superficial tumors.

III. Though it might appear that the tumors extracted from the thigh by Loyseau, were situated between the aponeurosis and integuments, it is at least certain that in one of the patients whom I have already spoken of, and who had them on different parts of the body, the disease had its seat underneath (*au-dessous*) the fascia lata.

IV. This patient having died, we had an opportunity of practising upon the dead body the operation that might have been performed upon him during life. One of the tumors which was situated upon the antero-external lower third of the thigh, was laid bare by an incision two and a half inches long. Having reached below the aponeurosis, I had still to isolate it from among the fibres of the triceps muscle. There it appeared to form an immense spindle-shaped ganglion, of the size of a nut, upon the continuity of one of the branches of the crural nerve. A similar tumor located in the upper third of the limb, was situated underneath the sartorius, and would have rendered necessary the division of a part of this muscle.

V. *The sciatic nerve.* The most remarkable neuroma I have seen, was situated upon the posterior part of the thigh, at four fingers' breadth below the breech. The tumor, which had existed for many years, and had developed itself without any known cause, in a lady aged thirty years and upwards, was of the size of the head of a newborn infant. Assisted by M. Gorsse, the physician of the patient, I extirpated it in the following manner. Being placed upon her belly, with a pillow under the trunk, Mlle. H. was held in this position, while the leg was kept extended by other assistants. Having made an incision in the integuments parallel to the axis of the trunk, and six inches in length and commencing at the outer border of the ischium, I had to cut through the sub-cutaneous fascia, the fascia lata and sundry adipose layers before perceiving the tumor. Having

isolated it on its posterior surface, it was secured with a hook and drawn backwards, while I detached it on its inner and outer side by means of a careful and delicate dissection. I disengaged it in this manner from the long portion of the biceps, which was pushed inwards with the semi-tendinosus and semi-membranosus. It was not until then that it became evident that the sciatic nerve supported the whole of this mass, of which it formed as it were the axis. The fear of inducing gangrene, or at least an incurable paralysis of the limb, by excising a nerve of this volume, caused me to hesitate an instant. Seeing however that the tumor was perfectly free at the middle of the great cellular track, (*trainée*,) which extends from the ischium to the ham, I asked myself the question, if it might not be possible to divest it of the nervous filaments and to remove it alone. After having therefore detached its whole circumference and dissected the nerve, first above and then below, as for an anatomical preparation, I recognized that there was nearly a third of it intact, or as it were enshrouded merely upon the anterior plane of the neuroma. The two other thirds of its cords were dispersed in the manner of the grill-work (*rayons*) of a cage or oyster pannier upon the two sides of the tumor. Encouraged by the extreme fortitude of the patient, I proceeded to isolate each one of those filaments by means of the bistoury, and succeeded in disengaging nearly the whole of them while pushing them towards their common centre in front. The neuroma thus removed left a cavity as large as the two fists, which I first filled up with small balls of lint, and then treated by secondary immediate reunion. The cicatrization of the wound appeared complete at the end of five weeks. An evident numbness and partial paralysis of the outer half of the foot and of the neighborhood of the corresponding malleolus, were the only accidents calculated to give me any uneasiness during the first week or two after this serious operation; but these symptoms subsided by degrees, and the cure, which was completed at the expiration of three months, remained permanent. It was in 1834 that the operation was performed. Mademoiselle H. married, and at the present time (December, 1838) is in the enjoyment of perfect health. Messrs. Roux and Chelius have each published a similar case, except that in the patient of M. Roux the tumor, which was of a cancerous nature, reappeared and terminated in death.

VI. I am not aware that other physicians have spoken of neuromas in the neck; for myself, however, I have every reason to believe that the tumor mentioned by M. Bérard, senior, and which I have spoken of under the article on *Excision of the nerves*, was one of this kind. I will add that in a dead body dissected by M. A. Thierry, I ascertained the existence of a spindle-shaped tumor of the size of a small pullet's egg, and of a reddish tint, on the middle of the continuity of the great sympathetic nerve at its cervical portion. It seemed as if this tumor might be a nervous ganglion excessively hypertrophied, and as it was no more adherent than normal nervous ganglions, it would have been evidently practicable to have cut down upon and extracted it, had it during life caused any serious symptoms. Proceeding in the same manner as for a ligature upon the carotid artery, it might have been removed without difficulty; and I do not think

the excision of a portion of the great sympathetic in a case of this kind, could be followed by any very formidable disturbance in the animal economy.

VII. Upon the thorax I have in four instances removed neuromatric tumors. Madame de T. for many years suffered neuralgic pains in the right side of her chest. A little tumor of the size and form of an almond, which had been noticed by M. Rayer, and which appeared to be the source of her sufferings, was situated between the 10th and 11th ribs, precisely at the place where the cincture of the gown is worn. To reach it, I was obliged by means of an incision of two inches, to divide the integuments, the sub-cutaneous fascia, some fibres of the latissimus dorsi and obliquus externus muscle, and afterwards the fibro-cellular layer which covers the external intercostals. Being hooked fast to and raised up by an erigene, the tumor caused a violent paroxysm of pain, and as it prolonged itself in front and backwards by a yellowish stem, it presented to me completely the appearance of a nervous ganglion. Having excised it posteriorly and then in front, I found there was no artery to tie, and drew the lips of the wound together by two strips of adhesive plaster, which I covered with a pledget of lint and body bandage. Some slight suppuration ensued, but the cure was nevertheless completed after the expiration of a short time. In the following year, that is, in the month of March, 1837, I was obliged to subject Madame de T. to a similar operation. A new neuroma had shown itself at an inch below and behind the first; the operation and its results were the same, and the patient has, up to the present time, (December, 1838,) remained free from any new trouble from this source. A young girl of 19 to 20 years of age, whom I operated upon at the hospital of La Charité in 1836, had at the same place, but upon the left side, a trilobate tumor of the size of a large nut, and which also presented the characters of neuroma. In this case an incision of three inches was required, and the tumor was almost entirely sub-cutaneous. Having dissected and removed it, I was nevertheless not enabled to close the wound by first intention, and the cure was not effected until at the expiration of five weeks. Another neuroma which I also met with on the thorax of a woman, was likewise situated at the same height. Are the constriction or frictions made there by the cord of the petticoat or the cincture of the frock, the cause in these cases? The case of the man which I have already several times alluded to, and who had so many neuromas dispersed over the chest and limbs, had one also between the cartilaginous border of the tenth rib and the umbilical region. In order not to be incommoded by the natural depression of the side, I laid bare the tumor in this case by means of a transverse incision slightly convex below. It became necessary therefore to cut through the skin, sub-cutaneous fascia and externus oblique muscle, for the tumor was situated quite deep. The extirpation was not in other respects difficult, but it required a ligature upon two arterial branches and left a sufficiently extensive cavity underneath the integuments. This patient, though cured of the operation, having a cancerous affection of the bones of the left wrist, underwent at a later period amputation of the fore-arm, which terminated in death at the expiration of twenty

days in consequence of numerous metastatic abscesses in the viscera and an enormous effusion in the pleura.

VIII. *Recapitulation.*—Neuromas as we thus perceive being ordinarily uniform and perfectly isolated in the midst of the other tissues, may be extirpated without great difficulty in almost all patients. If they occupy small nerves it would be a useless precaution to endeavor to detach them from these, rather than to excise the nerve and the tumor at the same stroke. In the contrary case and especially if the sciatic nerve were involved, we should do our utmost to detach the nervous filaments from it, at least in part, as I succeeded in doing in the case mentioned farther back. If this separation were utterly impossible and the accidents caused by the neuroma were really serious, we should still finish the operation, at the risk of interrupting the continuity of a large nerve. The facts which I have related under the article on *Excision of nerves*, and those which have been considered in this chapter, prove that the consequences of such an operation rarely compromise the life, that they do not always alter the functions of the limb to an incurable extent, and that very frequently in fact the phenomena of sensation and motion which had been believed to be permanently destroyed, are ultimately more or less perfectly re-established.

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## CHAPTER V.

### LIPOMAS, OR FATTY (Graisseuses) TUMORS OR WENS (Loupes).

Ever since surgeons, aided by the light of analysis, have sought to distinguish tumors rather by their nature than their form, the word *wen* (*loupe*) which was employed at first to designate all tumors, is scarcely ever used any longer except for such as are composed entirely of fat, which are the only ones recognized at the present time under the name of *lipoma* (*lipome*). After the example of some modern pathologists, therefore, I would understand by the word *loupe* or *lipoma*, which was invented by Littre (*Hist. de l'Acad. des Sc.*, 1709), tumors constituted of pure or degenerate fat. This species of disease which belongs to the class of hypertrophies, involves no danger in itself, and in reality incommodes only by its volume or weight, or the deformity it produces. Nevertheless lipomas appear to me to be susceptible of many kinds of transformation or decomposition. It is not impossible perhaps that they may undergo even cancerous degeneration; the putrescent transmutation (*la fonte putride*), however, is one of their most usual terminations. As on the other hand, however, these tumors scarcely ever disappear by resolution, and as their augmentation has no determinate limit, surgery must necessarily interpose its aid and devise means of disengaging patients of them. The remedies adapted to them are reduced to a small number, and topical applications of whatever description are devoid of efficacy. General remedies would be more dangerous than useful.

There is nothing in fact in such cases, if we wish to do any thing effectual, but the mechanical or chemical destruction of the tumor that can be resorted to; so that the entire therapeutic of lipomas definitively resolves itself into this principle: that is, to destroy them by caustics, the ligature or the cutting instrument, or to do nothing at all. So long as the lipoma possesses little volume, is imperfectly defined, or scarcely causes any inconvenience, or is deeply situated, we may, if there is reason to believe that its increase will not ultimately render its destruction more dangerous, wait and do nothing, or confine ourselves to some hygienic precautions. On the contrary, whenever the lipoma is superficial, well-defined and easily accessible to an operation, it is much better to attack them at once than to temporize. Though it should even be unfavorably situated, we ought to advise the patient to get rid of it in good season, inasmuch as the operation, the longer it is delayed, since it must ultimately become indispensable, presents so much the less chance of success, in proportion as the tumor is of older date or more voluminous. On this point I will take the liberty of making a remark.

Fatty tumors are far from being situated always in the sub-cutaneous tissue, as most modern pathologists maintain. Without mentioning those which are seen in the chest, abdomen and pelvis, they are sufficiently often met with also, underneath the aponeuroses and even in the central portion of the limbs. It is easy to comprehend also that lipomas may exist wherever the adipose cells are naturally intermingled with the other tissues; so that we ought to have reason to be astonished rather at their absence than their presence between the muscular layers and bundles (*faisceaux*). There are, therefore, under this point of view, two classes of lipomas: the *sub-cutaneous* or superficial, and the *sub-aponeurotic* or deep-seated, in the same way also as there are two kinds of neuromas and two orders of lymphatic tumors. In respect to regions for which they have a predilection, it would be difficult to specify them; for fatty tumors have been observed upon almost every part of the body. I have met with them on the supra-hyoid region, on the cheeks and forehead and in the supra-clavicular region, upon the shoulder, at the middle of the arm, on the anterior border of the axilla, in front of the sternum or abdomen, at the nape, on the back, in the fold of the groin, at the perineum and upon the thighs and legs. Dupuytren (*Journ. Hebd. Universel*, t. IV., p. 28.) speaks of a lipoma which occupied the lumbar region. Dorsey (*Elements of Surgery &c.*, *Journ. des Progrès* t. IX., p. 281.) mentions the case of a lipoma which was situated upon the dorsal region, where I have also seen them in two instances. In the patient of M. Graefe (*Gaz. Méd.*, 1835, p. 169.) the tumor was situated between the muscles of the abdomen; and below the clavicle in the case of M. Portulapi (*Bulletin de Féruccac*, t. I., p. 240. The *Lancet*, April, 1824, p. 24.) In a patient mentioned by M. Taramelli, the lipoma extended from the groin to the perineum (*Bull. de Féruccac*, t. XVI., p. 85.); while that extirpated by M. Taillefer (*Gaz. Méd.*, 1837, p. 93.) was situated in the dorsal region. M. Serre (*Ibid.*, 1838, p. 266.) has seen one at the posterior region of the neck and M. Syme (*Edinb. Med. and Surg. Journ.*, vol. 137, p. 381.) met with a curious example of one in the hollow of the axilla.

Thus, as I shall describe farther on, I have encountered enormous fatty tumors in the posterior region and depth of the thigh, upon the acromion, on the arm, at the side, under the axilla, &c.; so that there is nothing more variable than lipomatous tumors, both as regards their form, depth or volume, or the region where they are situated. We may consult on this subject, Chopart, Louis, M. S. Cooper, Alibert and M. Pautrier (*Thèse* No. 6, Paris, 1834.) There is scarcely any other mode of curing lipomas except by the ligature or extirpation. Though the red-hot iron or caustics, properly so called, might be applied without any very great danger to sub-cutaneous lipomas, it would be a different case with those that are deep-seated. It is moreover a kind of remedy which is not suitable to lipomas that are greatly developed, and one which in no case deserves the preference over the two other operations which I have just mentioned.

The ligature for lipomas, sometimes sufficient, rarely preferable, and never indispensable, would not be conveniently applicable but to those which were pediculated or not of large volume. It should be applied, moreover, with the same precautions and by the same processes as for cutaneous and erectile tumors. It would also be applicable for fatty tumors, as for all others, to strangulate their roots after having dissected them, if there should be any great difficulty experienced in avoiding the deep-seated vessels; but their extirpation is, in truth, the best, and I might say, almost the only resource. In cases of sub-cutaneous lipoma, nothing is so simple as this operation. If the tumor is but of little volume, a straight smooth (unique) incision is first made through the integuments, either a T, or crucial, or semilunar, or a V, or L, or an ellipse, or even stellated, if any advantages are to result from it. As the tumor contains no liquid, there is no danger in wounding its tissue while cutting through the skin. As these tumors do not usually contract any intimate adhesions with the neighboring tissues, they are generally easily isolated and detached from the surrounding cellular texture; though even some pelotons should be left behind, the cure would not on that account be materially interfered with; and as they receive no large-sized vessel, they may be extirpated without incurring the risk of any serious hemorrhage. The teguments with which they are surrounded being scarcely ever diseased, may be preserved, reversed, and then approximated in such manner, after the operation, as to be brought into contact at every point. The bottom and flaps of the wound being almost constantly composed of sound tissues, surprisingly facilitate all the efforts at immediate union or primitive agglutination.

The extirpation of lipomas is thus one of those operations which are performed with the least repugnance, and undertaken with the greatest degree of confidence. Nevertheless, it would be wrong to decide upon it on too slight grounds. An adult man, strong, and of good constitution, and about fifty years of age, came to the hospital of Saint Louis, in 1822, for the removal of a lipoma of the size of the two fists, and situated upon the postero-superior part of the right shoulder. The extirpation of this tumor, which was performed by M. Richerand, presented at first nothing peculiar. But an erysipelas, which ultimately extended from the shoulder to the nape, and from the neck to the cranium, soon put a period to his life. An old

man who had a lipoma, larger in volume than the head of an adult, appended as it were to the posterior region of the neck, operated upon by M. Roux, in 1825, at the hospital of the Faculty, also perished in a few days. When, therefore, we decide upon extirpating lipomas, it is important to guard against the general consequences of operations, in the same way as in the extirpation of all other sorts of tumors.

### ARTICLE I.—SUB-CUTANEOUS LIPOMAS.

The arrangement of the incisions and the character of the operative process, ought moreover, in general, to vary, according to the size, form, and seat of the tumor. M. Gensoul (*Pautrier, Thèse No. 6, Paris, 1834.*) who, like MM. Rust, Walther and Textor (*Rust's Hand. der Chir., t. VI., p. 683*), first plunges a long knife through the root of the tumor to separate it, first on one side and then on the other, has the advantage of terminating the operation rapidly; but he runs the risk of sacrificing useful integuments and cutting out irregular flaps. It is better therefore to make use of the bistoury, and to divide the skin from without inwards, and to prepare flaps of suitable form and extent, to be well adapted to, and to cover over, the wound accurately after the removal of the tumor. Fabre (*Observ. de Chir., in-12, 1778*) after having laid them bare by a longitudinal incision, and passed a ribbon through their base in the same direction, so as to enable him to draw them towards him, recommends that we should strangulate their root by a ligature, which being tightened gradually during the dissection, has the advantage of pushing out (*chasser*) the tumor and benumbing the pain; but it is doubtful if this process, which is not every where practicable, finds many partisans at the present day. Complex incisions also are not indispensable but for lipomas of a certain size. By means of a straight incision I was enabled to remove from the root of the shoulder a lipoma of larger size than a pullet's egg. Nevertheless, if the integuments should be too much attenuated, the tumor approach the size of the fist or exceed it, or the skin have undergone the least degenerescence, it would be preferable to have recourse to complex incisions, and even to sacrifice a portion of the integuments, rather than rely upon a simple incision.

#### § I.

A young girl from the country, whom M. Rayer desired me to operate upon in his wards, at La Charité, had in front and below the left clavicle a trilobate lipoma, of the size of the fist. After having first made an incision through the tissues from the neighborhood of the sternum to the root of the shoulder, I then divided the skin from above downwards to the extent of two inches, making thus two triangular flaps, which were dissected and reversed, the one outwards and the other inwards. After the removal of the tumor these two flaps were readily raised up to the horizontal branch of the T and adapted to the bottom of the wound by means of strips of adhesive plaster.

## § II.

A man aged from 45 to 50 years, who had in the supra-clavicular depression a lipoma, which a charlatan, by means of different caustics, had transformed into a bleeding fungus, was received, in 1837, into the hospital of La Charité for the purpose of having his tumor removed. The integuments in this case being destroyed or degenerated, I was obliged to surround the lipoma with two curved incisions, and to remove with it an ellipse of the skin and of the celluloadipose sub-cutaneous tissue. An erysipelas supervened, but the patient, nevertheless, got well in a short time, as also did the young girl whom I have just spoken of.

## § III.

A woman of more than usual embonpoint, had between the lower border of the axilla and the side of the thorax a badly-defined lump of the size of an egg, which caused her, she said, acute suffering. For the removal of this tumor, which was continuous and without *any line of demarcation*, with the general adipose tissue, I required only a simple incision three inches in length, and parallel to the lower border of the pectoralis major near the chest.

## § IV.

Another woman from 35 to 36 years of age and whom M. Ribail had sent to me, had in front of the acromion and on the anterior surface of the right deltoid muscle, a lipoma, slightly flattened, lumpy (*bosse-lé*), and of the volume of a pullet's egg. I was enabled to remove this also by the straight incision, and the cure was not interfered with by any serious accident. A young girl who was sent to me by Doctor C. Piron, had a lipoma of the same size as the preceding on the acromial side of the left shoulder. Here the adhesions were such that I considered it proper to lay it bare by means of a T incision, whose stem was turned backwards and slightly outward. This patient was also cured.

## § V.

In the case of the young man mentioned farther back, and who had a slightly elongated fatty tumor of the size of the fist, below the lower jaw, I was equally obliged to recur to the T incision; nor did any inconvenience result from it, and the patient soon recovered. There is every reason to believe, however, that a semilunar incision, with its free border below, would have permitted me, by raising up by dissection the flap of soft parts thus circumscribed, to complete the operation with as much certainty and security.

## § VI.

Having to remove a lumpy (*bosse-lée*) lipomatous tumor of the size of a small egg, and of very irregular form, on the left side of the waist of a woman who was admitted into the hospital of La Charité in 1837, I limited myself to a simple incision of three inches in length, and parallel to the direction of the neighboring rib. Immediate reunion took place, and the patient was well in a few days, and without any suppuration. Recently, on the 18th of December,

1838, I removed a similar tumor which a student of medicine had upon his right side. I made a vertical incision slightly convex posteriorly, and in five days after the young man was cured. These examples, I presume, are sufficient to point out the different modes of extirpating superficial lipomas of moderate volume.

### § VII.

But if the tumor should be of a larger size, we must proceed in another manner, always, however, in conformity with the anatomical requirements of the region, or of the part where they are situated. If the ancients had given more details of their experience, we should probably have had evidence of large-sized lipomas having been noticed by them. That horrible tumor of the size of the head, and which subsided and increased, and hung near the ear of a baker, mentioned by Felix Plater, (Bonet, *Corps de Méd.*, t. III., p. 14,) was it not a fatty tumor? The one called steatomatous by Lotichius, (Bonet, t. IV., p. 322,) which was also of the size of a man's head, and likewise situated behind the ear, evidently belonged to the class of lipomas. We see also by a case of M. Serre (*Gaz. Méd.*, 1838, p. 266,) that fatty tumors upon the posterior region of the neck may acquire an enormous volume, and a weight of at least seven pounds. The one I noticed in 1825, and which occupied the same region, was not less voluminous than the steatoma mentioned by Lotichius or by F. Plater. It appears that M. Miller even had extirpated one of the weight of twenty pounds, and which M. Warren (*Surg. Observ. on Tumors*, p. 55,) was enabled to show entire to his pupils. Whatever may be the volume, lipomas of the posterior region, of the neck or ears, are nevertheless extirpated nearly in the same manner as superficial fatty tumors in general. While almost constantly sub-cutaneous in these regions, they have scarcely much greater breadth to their root when very voluminous than when they are in the condition of small lipomas. But the danger of their extirpation lies in the depth of their root, and in the thickness of their pedicle, much more than in the totality of their mass. There is nothing to avoid there but the occipital artery or the auriculo-mastoidean above, and some branches of the cervical arteries below. The patient operated upon by M. Serre recovered perfectly well, and there is nothing to induce us to think that the operation should be more dangerous here than anywhere else. A steatoma of the size of the head, which was situated upon the occipital region of a child two and a half years old, was removed by M. Seerig with perfect success, (*Arch. Gén. de Méd.*, 3e série, t. I., p. 115,) while F. de Hilden, (Bonet, p. 83,) on the authority of a letter of Scretta, speaks also of a child two months old, and which was operated upon in this manner at the hospital of Strasburg, for an enormous tumor which it had on its nape.

### § VIII.

The posterior region of the trunk also has frequently presented these enormous lipomas. The alleged sarcoma of such prodigious size which formed between the shoulders in a woman mentioned by F. Plater, (Bonet, t. III., p. 14,) and which was successfully removed, was probably a degenerate lipoma. Dupuytren removed one of

these, which was partitioned off with several osseous plates, and which was situated above the lumbar region, in a woman aged sixty years. Dorsey (*Journ. des Progrès*, t. IX., p. 280,) states that he removed from the back of a man a lipoma which weighed twenty-five pounds. The cure took place rapidly, and the figure given by the author shows that this tumor held on to the trunk only by a sort of fold of the integuments. A friend of A. Petit, (*Anat. Chir. de Palfin*, t. II., p. 19.) by making use of the ligature, was enabled to separate from the dorsal region, a lipoma of twenty-eight pounds, and another of forty-eight pounds. A patient, seen by Petit himself, had one upon the back, which *must* have weighed at least sixty pounds. A lipoma in the same region, of four pounds' weight, was since extirpated by M. Taillefer, (*Gaz. Méd.*, 1837, p. 93,) who united the wound by suture, and cured his patient in fifteen days; so that on this plane of the trunk the extirpation of fatty tumors presents numerous chances of success, whatever may be their volume and weight.

## ARTICLE II.—SUB-APONEUROTIC LIPOMAS.

### § I.

Though lipomas may exist on the anterior region of the body, the remark, nevertheless, is true, that they are less frequently developed there than behind. The largest sized one I have noticed on the sternum did not exceed the dimensions of the fist. There is no proof to show that the tumor shaped like a ball, of the size of a man's head, and which was situated in the substance of the parietes of the abdomen, as mentioned by F. Plater (Bonet, t. III., p. 15), was a fatty tumor, rather than one of any other kind.

### § II.

That which M. Graefe (*Gaz. Med.*, 1835, p. 169,) extirpated under the title of lipoema, and which was situated below the obliquus externus, was it in reality a fatty tumor? It is readily conceivable, moreover, that the operation would not be sensibly more difficult in front of the chest than in the dorsal region. But in the abdomen the case would be different if the tumor really had its seat underneath the muscles or aponeuroses. The risk of wounding the epigastric, internal mammary, lumbar or intercostal arteries, would here be among the least of the inconveniences to encounter from the operation. It is the neighborhood of the peritoneum and the development of inflammations and of consecutive suppurations, which would then be the real sources of danger.

### § III.

The same dangers would exist if the lipomas were developed in the sides or hypochondriac regions. Lotichius (Bonet, t. IV, p. 321,) states that he saw in the hypochondrium of a patient, a steatoma of the size of the head, and that the extirpation of this tumor undertaken by a charlatan, was followed by death at the end of two days. F. Plater (*Ibid.*, t. III., p. 15,) also speaks of a tumor which had a strong resemblance to the brain, and which existed in a young man, on the left side, near the back; but no one had the courage to undertake its

removal. That case of a *carcinoma*, also, which occupied the right hypochondrium, was of the size of a child's head, and extirpated with success, and the history of which is given by Bartholin, (Bonet, t. IV, p. 461,) was it not, perhaps, a degenerated lipoma? M. Warren (*on Tumors*, p. 57,) has extirpated a lipomatous tumor above the side and hypochondrium, and which was situated between the ribs and the lower portion of the serratus magnus.

#### § IV.

Be that as it may, it is in the vicinity of the root of the limbs and upon the limbs themselves, or on the thorax, that the largest sized lipomas have been noticed. I do not speak here of the man whom M. Sédillot showed me, and who had the whole circumference of his neck surrounded by an enormous collar-shaped (bourrelet) indolent, lumpy [bosselée] tumor, because I am no more certain that this was of a fatty character, than I am that that was in the child mentioned by M. Warren, (*Ibid.*, pl. 14, p. 428.) Another patient whom M. Lebatard sent to me in 1838, had the whole of the neck imprisoned, as it were, in enormous masses of a lipomatous appearance, at the same time that similar tumors existed in the axilla and groins; but neither here, also, am I certain that they were legitimate lipomas.

#### § V.

In the region of the *shoulder* they have been noticed above, in front, behind and outside. The patient operated upon successfully in 1823, by M. Portulapi, had a lipoma of fifty-two pounds' weight, the root of which was situated in the subclavicular fossa. Already this surgeon, in 1814, had removed another lipoma weighing fourteen pounds. Dupuytren (*Archiv. Gén. de Méd.*, t. V, p. 430,) removed one weighing six pounds, situated on the posterior part of the shoulder of a patient, who recovered; and I have, as I have said, observed many others of a certain size, which were situated also upon the stump of the shoulder, properly so called.

Though in the supra-clavicular depression, lipomas rarely acquire an extreme volume, they present here at least some particular features in connection with their extirpation, and dangers and difficulties which it is important not to be ignorant of. Those which are subcutaneous demand no further attention there than elsewhere. It is when they are situated beneath the aponeurosis, that their diagnosis and removal may be difficult. The softness of the neighboring tissues, the void which the hollow of the axilla opens to them in front and upon the outside, and the subscapular cavity behind, admit of their being depressed and flattened with extreme facility, and of projecting or disappearing, so to speak, in the manner of a congestive abscess (*abcès par congestion*) or varicose tumors, and of appearing soft like a hernia or abscess, or conveying the idea of a disease altogether different. I had a woman for several months at La Charité in 1838, who carried a lipoma of this kind in the left supra-clavicular depression, and who in this manner became the subject of very different opinions on the part of those who had an opportunity of examining her. Another patient whom I operated upon with M.

Maingault, had a tumor in the same region, whose size did not appear to exceed that of a pullet's egg. An incision extending from the outer border of the sterno-mastoid muscle, to the apex of the acromion in the direction of the omo-hyoideus muscle, enabled us, after having divided through the integuments and aponeurosis, to lay the tumor bare. In order to isolate it, it became necessary to divide many branches of the cervical plexus. Having arrived below the clavicle in front, and upon the anterior side of the border of the scapula behind, we recognized that this tumor, which seemed so accurately defined at first, prolonged itself into the hollow of the axilla, where it became necessary to penetrate the whole depth of my finger to detach it by enucleation from below upwards, from among the nervous cords which compose the brachial plexus. I removed in this manner, by a laborious and tedious dissection, a completely fatty mass of very irregular shape, and of the size of the fist. We left in its place an enormous cavity, which was filled with small balls of lint, and which ultimately cicatrized so perfectly and in so simple a manner, that the patient was enabled to return from Paris to Rouen at the expiration of a month.

### § VI.

It is rare that lipomas acquire in the arm or fore-arm, sufficient size to require our attention to be called to them as tumors of a remarkable character. The thoracic limb properly so called, is in fact one of the regions of the body where fatty tumors are the least frequently observed. Upon the supposition that the species of steatoma which was situated underneath the skin of the fore-arm in a patient mentioned by M. Galenzowski, (*Journ. des Progrès*, t. VIII., p. 221,) was a lipomatous mass, rather than a tumor of some other description —this at least would be an exception; for I repeat that lipomas of the upper extremity rarely exceed the size of an egg, and it would be difficult if not impossible to cite a series of examples where they originated underneath the aponeurosis. Fabre (*Observ. de Chir.*, in-12, p. 51,) however gives a remarkable instance of one. The tumor was monstrous. Extending from the apex of the deltoid to the external condyle of the humerus, it was prolonged transversely under the cephalic vein, then between the brachialis internus and biceps muscles, continuously with the external aponeurotic intersection of the arm.

### § VII.

The *thigh* on the contrary has often been invaded by this description of tumors, and it is there especially that we encounter them of a remarkable size. M. Taramelli (*Bulletin de Féruccac*, t. XVI., p. 85) states that he successfully extirpated a lipoma weighing eight pounds, which reached from the root of the fold of the groin to the perineum. A tumor which weighed eighteen pounds, and whose root ascended into the pelvis at the perineum, and which M. Kohlrusch (*Ibid.*, t. XII., p. 232) who describes it as a steatoma, succeeded in removing so as to cure his patient, was evidently also of a lipomatous character. M. Benedict, (*Bull. de Féruccac*, t. I., p. 239,) in fact relates, that he

extirpated from the thigh a fatty tumor, caused by a fire-arm, and in which he found some pieces of money ! In 1838, I removed from the outer and lower part of the thigh, in a woman 40 years of age, a fatty tumor of the size of the head ! This lipoma, which had existed for years, and which might have been taken for an encephaloid tumor, required an incision of ten inches in length in the direction of the vastus externus muscle, and another much shorter, transversely in the direction of the ham. The dissection discovered to us, that this mass, in place of penetrating beneath the aponeurosis in the ham, had simply depressed the fascia lata in the direction of the gastrocnemii muscles between the tendons of the biceps and semi-tendinosus, and then in the external supra-condyloid groove of the knee. No accident supervened, and the cure, which has remained perfect up to the present time, (January, 1838,) confirms what the dissection moreover had authorized us to believe, that the tumor in question was a lipoma, and not a cerebriform tumor.

### § VIII.

Also it is the same with lipomas of the thigh and leg, as with lipomas in every other region of the body; whatever may be their volume, their extirpation is generally attended with but little danger when they do not go beyond the depth of the sub-cutaneous layer. It is no longer so however, when their root is situated among the muscles. In such cases the patient cannot be relieved of them but by means of a dangerous operation ; the more so as fatty tumors of this description readily acquire a very large size. There was one of this kind at the hospital of Saint-Louis, in 1837, the size of which was equal to two adult heads. In a patient mentioned by M. Klein, (*Graefe und Walther Journ.*, vol. I. p. 112,) the lipoma reached from the breech to the ham, and weighed near 28 pounds. A woman who was admitted into the hospital of La Charité in 1836 had a similar tumor in the same region ; and in 1837 I operated for another which weighed 32 pounds in a man from the country, who had also a lipoma of the size of a child's head in the dorsal region. Fatty tumors therefore constitute in this region an extremely serious disease. Originating among the muscles, in the midst of pliant tissues, they ordinarily acquire great dimensions in their vertical diameter, before becoming prominent under the skin. In the woman I have spoken of, the tumor, which descended down to between the gastrocnemii muscles, and ascended nearly as high as the attachment of the gluteus maximus, and had extensively separated the muscles and vessels, and was eighteen inches long and eight to ten in thickness, nevertheless weighed only from eight to nine pounds. The one I removed in 1837, and which occupied precisely the same region, ascended about five inches higher than the first and descended only to three or four inches below the knee. Though it weighed 32 pounds and was of enormous volume, as the cast of it in wax which was deposited in the museum of the Faculty shows, yet it had not deformed the substance of the thigh to a much greater depth than that of which I have just spoken. The patient operated upon by M. Klein and in whom the tumor singularly resembled in its situation, nature and weight, that of

the patient on whom I myself operated, died on the ninth day, while mine succumbed on the eighth. The woman, on the contrary, whom I have mentioned first, ultimately recovered; when at the end of three months and after having experienced several attacks of erysipelas, she left the hospital, she continued to walk for a long time in the wards, and the wound had completely cicatrized. When called upon to such tumors, the surgeon ought to put to himself a number of questions. Knowing that the patient cannot be relieved of the difficulty without endangering loss of life, he ought first to ask himself if it is proper to meddle with the case. Should the tumor incommod only by its weight and volume, and had not undergone any degeneration, and had developed itself very slowly and made no further progress, perhaps it would be more prudent to respect it especially in a person in advanced age or dyspeptic (cacochyme.) In the contrary case we have no resource but extirpation of the tumor or amputation of the limb, as the dimensions of the pedicle no longer admit of the employment of the ligature and as caustics are inadmissible in any case. Amputation of the thigh for a lipoma has something in it strange and repugnant. It is true that in order to remove these enormous tumors, we may be obliged to divide a certain number of the posterior muscles of this part of the limb; that the continuity of the femoral vessels and of the sciatic nerve, run some risk of being implicated, and that in every case we are more or less compelled to create an enormous wound, whose suppuration is necessarily exceedingly dangerous. But besides that most of the muscles, from being simply spread out or widened apart, may if necessary be avoided, the lobes of the lipomatous tumors are ordinarily sufficiently movable to allow of their being readily enucleated from the periphery of the vessels and nerves. Moreover, the division of the femoral artery or sciatic nerve, would it necessarily result in gangrene and death? It is not to be forgotten that amputation in such cases is to be performed either in the articulation itself or very near the great trochanter, and that besides the slight prospect of success it presents, there would nevertheless, even under the most favorable circumstances possible, be thereby produced an immense amount of mutilation; while the pure and simple extirpation of the tumor, which in the aggregate would not be more dangerous than the extirpation of the limb, would at least have the advantage, should it succeed, of effectually curing the patient. I would not therefore prefer amputation of the thigh to extirpation of the tumor, unless it should be found impossible to operate without wounding at the same time the crural artery and nerve as well as the sciatic nerve. Of the two patients I operated upon, one it is true died, but he had been exhausted by long-suffering and was near sixty years of age; the other however recovered, though the dissection in her during the operation had been almost as extensive as in the other.

The extirpation of these lipomas, however, in this region, is more frightful or dangerous than really difficult: to accomplish it I adopted two different modes. In the first case I made an incision which went directly down to the adipose tissue, and extended from the tuberosity of the ischium along the semi-tendinosus muscle as far down as below the ham. Transforming this first into a T incision, I

divided the tissues outwardly as far as to the external side of the triceps muscle. Having reversed the two flaps of the T, I had only to divide the two thirds of the long portion of the biceps. Then dissecting the tumor with free strokes of the instrument, I detached it first on its outer side, then inwards and then from above downwards, either by means of the bistoury, or with the fingers or the handle of the scalpel, completing the extirpation in less than five minutes. In the second patient the mass was so immense, and furrowed by veins so numerous and so enlarged, that I deemed it proper to remove with it a large ellipse of integuments. I was obliged in this manner to include in the incision a portion of the biceps muscle, and of the semi-tendinosus, semi-membranosus and gracilis muscles, which were broadly spread out in the manner of a membrane, upon the surface of the lipoma. Having detached this gigantic tumor from the external parts of the leg and thigh, I tore out a lobe from it from below the breech, and then a second from the hollow of the ham; but from its having enveloped the vessels in its extension inwards, the dissection on this part became difficult and laborious. The great anastomosing artery, which I could not avoid at the distance of two lines only from the trunk of the crural, made me fear at first that I had wounded this last. The isolation of the sciatic nerve also was not unattended with difficulty. The operation nevertheless, notwithstanding the rupture of two or three putrescent (putrilagineuses) cavities which I had to empty as I proceeded, was neither very long nor very laborious; it did not last over a quarter of an hour. In neither case did the approximation of the lips of the wound present any difficulty. But for the attacks of erysipelas and some menaces of purulent infection which supervened in the woman operated upon in 1836, accidents which may be developed after an operation of the least serious nature, the cure certainly would not have required more than five or six weeks to be accomplished. In the man who perished, and upon whom I did not operate until after having taken the advice of MM. Ribes, Larrey, Marjolin, Sanson, Laugier, Bérard the elder, Bérard the younger, Monod, Robert and all the other distinguished surgeons of Paris, death appeared to have been the result of defect of reaction, and as it were exhaustion of the vital principle. These operations, however, up to the present time have not been performed sufficiently often, to enable us to appreciate with exactitude their value or their danger.

### § IX.

I would remark in conclusion, that lipomas, like lymphatic tumors and neuromas, are so easily detached from the surrounding tissues, that enucleation is applicable to them, and ought to be substituted to the employment of the bistoury, wherever there would be danger of wounding the large vessels or important nerves. Being situated independently, and as it were without any organic attachment, in the midst of the tissues, they may moreover be torn out without fear by means of the finger or any other mode. They are the kind of tumors in fine whose extirpation, all other things being equal, involves the fewest dangers, and presents the best chances for success.

together with the greatest degree of facility and simplicity in the operative manual.

[*Fatty Tumors.*—Our countryman, Dr. Parker, a missionary in China, has had much practical experience in a peculiar form of enormous *cutaneous or fatty tumors*, which he has seen or operated for successfully during his philanthropic labors. In a recent memoir of his, published in Cormack's *Monthly Journal of Med. Science*, (June, 1846, p. 393, &c.) he mentions one in a beggar aged 35 on the right side of his face, and which increased in ten years to two and a half feet in circumference. Dr. Parker extirpated it without difficulty by two elliptical incisions, each eighteen inches long. It weighed near nine pounds, and was of glandular structure, with a few cells containing a yellow or dark fluid, and was in part cartilaginous. A slight paralysis only was left from the division of the portio dura. The patient recovered so well in three weeks as to perform the duties of porter to the missionary hospital. These excessive growths of a lipomatous or with mixed cartilaginous and encysted organization, and which in some cases have been seen by Dr. Parker (according to the paintings he exhibited at New York,) to extend *like wings* from the whole posterior portion of the trunk and lower limb on one side, appear to be the result of the excessive indulgence or gluttony in the Chinese for farinaceous and other non-nitrogenized kinds of food, that favor fatty growths and accumulations. See note on Mr. McIlvalne's views on this subject, Vol. II.]

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## CHAPTER VI.

### ELEPHANTINE TUMORS.

The class of elephantine tumors, very common in Africa, the Indias, and many countries of Asia and America, but rare in Europe, and especially in France, are met with only as an exception in other than the genital organs either of men or women. Being caused by an hypertrophy, together with degenerescence of the integuments, or cellular tissue, and sometimes of the aponeuroses and muscles, they may acquire a development still more considerable than lipomas. I have seen instances of them upon the nose, ears, feet and hands, and some other regions of the body. In 1836, at the hospital of La Charité, a woman was brought to me, of about forty years of age, who had the hand, fore-arm and elbow three times their natural size, in consequence of a degenerescence of this kind, and in whom the upper half of the arm, as well as all the other parts of the body were in a perfectly sound condition; so that the disease had become suddenly arrested at the distance of two or three inches above the humero-cubital articulation. A man in whom I extirpated the limb at the articulation, and to whose case I have elsewhere alluded, had upon his right arm a similar degenerescence, which extended from the extremities of the fingers to the shoulder, and ultimately became

complicated with a cancerous or colloid transformation at the centre of the humerus. I have met with many instances of persons who had in this manner the foot and the leg, either partially or wholly enlarged to double, triple, or even quadruple their natural size. In one of these patients the elephantine tumor abruptly terminated in the form of an enormous lardaceous collar, at some inches below the knee. In the greater part of them the disease imperceptibly disappeared above, and in all of them the limb truly exhibited the appearance of the leg of an elephant. Should the tumor be accurately defined, as in the case of those I have been describing, and should it have been of long standing and have resisted all the means indicated by a judicious therapeutic, we may, should the person be in other respects in good health, propose its removal. But in such cases it is amputation of the limb itself only, which presents any chances of success, or that can be had recourse to. In all cases, on the contrary, where the elephantine degeneration shall appear to be imperfectly limited or prolonged under the form of indurated plates or radiations beyond the tumor itself, properly so called; or complicated with plates or projections of a similar nature, on other parts of the body; or we have reason to suspect the slightest alteration in the viscera; or that the health of the patient has been profoundly deteriorated, we must be cautious not to meddle with it, or confine ourselves to palliatives. I shall, however, return to these tumors in speaking of operations performed on each region of the body, in particular, and especially upon the scrotum or vulva. The tumors called keloid, (keloides) which I have seen in the form of a firm, reddish-colored lardaceous plate, four to six lines in thickness, and two inches in breadth, upon the shoulder of a young lady, who had already been operated upon for it, by M. Forget; which I have met with also, under the angle of the scapula, in the dorsal region of another female; and which M. Warren, (*on Tumors, etc., p. 45, pl. 3,*) who has described them, appears also to have observed on the shoulder; should be destroyed by means of the zinc paste, or extirpated with the same precautions as if they were of the character of an erectile or elephantine tumor. Extirpation would be applicable only to the *eloid* (*eloides*) tumors described by the same author (*Ibid., p. 48, pl. 4*), and which show themselves under the form of a bunch of agglomerated enormous-sized leeches, or of a small intestine coiled up upon a circumscribed point of the skin.

[M. Colson, of Noyon (France), describes (see *Journ. des Connaiss. &c., de Paris, Mai, 1842, p. 189 et seq.*) a remarkable case of African elephantiasis in a woman who died at the age of 53, after fifty years of suffering from that and the antecedent diseases which appear to have led to its production. The privations of poverty, impoverished diet and constant residence in a marshy situation (commune of Salency) predisposed doubtless to this train of maladies, which commenced in infancy after small pox with a large tumor on the right side of the vulva, which after some years' continuance was destroyed by an empiric by means of caustic. The right side of the abdomen and thigh however began to swell before her catamenia appeared, when another empiric attacked these parts with the cautery and caustics, applying these remedies both above and below the

knee, the last of which caused erysipelas and gangrene of the leg, and denudation of the tibia. This last wound partially recovered, but continued an open, discharging ulcer for many years—the hypertrophy of the thigh also gradually increasing. Worms were engendered in these foul ulcers. At the age of 38 this wound healed, and ulcers were established at the malleoli. The menses were most of the time regular, but the urine was occasionally suppressed, which latter difficulty was relieved by nitrate of potash drinks, bringing on copious evacuations of this secretion, which sometimes had a milky appearance. The thigh at the middle part was over thirty-seven inches in circumference, covered on the posterior part, as was also the dorsum of the foot, with thick, offensive incrustations, also in various parts with tubercles (as is common in tropical elephantiasis), while the leg of the diseased limb was also hypertrophied in its lower part to the dimensions of over twenty-one inches in circumference, having enormous red vegetations about the ankles—the whole limb being at least three times the size of the other. It retained to some extent the powers of flexion and extension. T.

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## CHAPTER VII.

### HEMATIC TUMORS.

A kind of tumors whose pathology might constitute several species, and which had scarcely been noticed before I described them in 1826, and afterwards in 1833, are those which are caused by effusions of blood. These tumors which have a predilection for the synovial bursæ, and which sometimes form for themselves cysts in the cellular tissue, are either solid, fluid, or semi-fluid, or sometimes constituted of a melange of concrete clots with matters that are altogether of a fluid nature. I shall, when speaking of cysts (*kystes*), return to those which contain rather fluid than concrete matters; at present I shall confine myself to solid hematic tumors. These tumors perhaps are more common than would at first be thought. I have elsewhere remarked (*Traité des Contusions*, Paris, 1833), that certain polypi of the uterus, some tumors of the prostate, with steatomas of the head, breast, &c., often appeared to me to owe their origin to an effusion of blood or fibrinous concretion, and numerous facts have since confirmed me in this opinion. This much, however, is certain, that most of the tumors described under the title of steatoma or lipoma, and which do not belong to the order of fatty tumors, enter into the category of hematic tumors. The tumor of 188 grammes in weight, which a patient carried for the space of twenty years upon the right side of his head, under the denomination of a lipoma, and which was successfully extirpated by M. D. Lasserve (*Cas de Chir.*, pp. 21, 22, 23, Perigueux, 1833) was to all appearance nothing more than a degenerate hematic tumor. The same was the case as I should think, with another tumor of the size of an egg, situated below the mamma to the left on the thorax of a man, and

which the same practitioner removed ; also with that which existed upon the shoulder and which he also extirpated ; the same with a cyst filled with matter resembling boiled rice and situated upon the left cheek of a man ; and with the cyst still larger, which a woman had on her knee, together with some other tumors, for which M. D. Lasserve in like manner operated. Hematic tumors differ from lipomas in general, in this, that they are scarcely ever pediculated ; that they rarely exceed the size of an egg, the fist or the head ; that they are almost constantly surrounded with an irregular cyst when they are situated in the cellular tissue, but sufficiently regular, on the contrary, when they are formed in the bursæ mucosæ or the synovial cavities ; in this also, that the matter of which they are composed, is either clotty or fibrinous or fibrous, and of a variable color, yellowish, gray, sandy (rousse) or brownish ; and that serous or synovial matter is frequently found mingled with it. Like lipomas, hematic tumors do not usually cause any pain, and incommodate in reality only by their volume or weight. Like lipomas also, and perhaps more frequently than them, they appear to be susceptible of degenerating and undergoing transformations of a bad character. No topical application or internal medication can destroy them when they are of old date or have acquired a certain volume. Caustics, the ligature and extirpation, therefore, are the only remedies we have at our command.

#### ARTICLE I.—HEMATIC TUMORS IN GENERAL.

##### § I.

*Plasters*, liquids and all kinds of discutient (fondants) topical applications, by which we sometimes succeed in obtaining resolution of sanguineous deposits, have no longer any efficacy when we have under treatment an ancient hematic concrete tumor. These means, eulogized by M. Champion, as irritating injections have been by M. Asselin, (*Considérations sur les Bourses Muqueuses*, Strasbourg, 1803,) possess in reality no value except in recent hematic tumors.

##### § II.

*Caustics*, besides their inconvenience of destroying integuments which it might be advantageous to preserve, would also be attended with the objection of exacting a considerable space of time, and of failing in the majority of cases. A surgeon mentioned by Lombard, (*Opuscules de Chirurgie*, p. 108, 1786,) who wished to destroy at every possible hazard a tumor evidently hematic, in front of the knee, by means of caustics, could not effect his object, but caused by this means several abscesses in the neighborhood of the patella. At most, therefore, escharotics under such circumstances, could only be employed in association with the ligature, as was practised by F. Aquapendente and has been since done by Chopart and Sabatier ; or in the case of those persons who peremptorily refuse every other kind of operation.

## § III.

The *ligature* upon hematic tumors is still more uncertain than for lipomas. As these tumors almost always present a very large base, and have besides a more or less distinct cyst, they are badly adapted to constrictive means, and do not find in such resources their best remedy.

## § IV.

It is to *extirpation* therefore that we must have recourse, if we wish to relieve the patient. The question might then be asked, if it would not be sufficient to lay open and empty the cyst? To this first question we may reply, that the simple incision, which would doubtless sometimes succeed, would most frequently prove unsuccesful, expose to more accidents than extirpation, and render the remainder of the operation obviously more difficult. If Paroisson (*Opuscules de Chir.* etc., p. 94, 1806,) was enabled to extract a cyst of this kind by a simple incision, it was because inflammation, excited in the cyst by an irritating injection, had previously isolated it from the surrounding tissues. All that we can demand in such cases is, to know if it is indispensable to carry away the totality of the cyst with the tumor, or limit ourselves to the excision of the latter. Saint Christeau, (*La Chirurgie Pratique*, p. 180, 1697,) having restricted himself to emptying a steatoma of the size of the fist, which was situated upon the inner side of the thigh, found himself obliged to scarify the internal surface of the sac, and to dress the cavity with an exciting digestive before he could effect its cicatrization.

## § V.

*Excision*, properly so called, is of such doubtful efficacy, that J. Fabrice, (*Œuvr. Compl.*, partie 2, p. 620,) was already aware of it, and in his time recommends that we should divide the vessel which nourishes the remains of the cyst. This mode, however, has been since lauded, first by Chopart and also by Louis, or by Percy, (*Dict. des Sc. Méd.*, t. XXVII., p. 44, 45,) but it is to Mosnier, (*Thèse*, Paris, an XI.) and to Bourdet, (*Essais sur les Loupes*, p. 23,) that it is specially indebted for having been rescued from oblivion, and been made to assume a kind of celebrity at the commencement of the present century. Mosnier pretends that after this operation, the bottom of the wound is transformed into cicatrices, and takes the place of integuments. The facts, nevertheless, advanced by those observers, and which are applicable at most to certain regions of the body, have not been of a character to convince any one, or to be received as laws, and extirpation, properly so called, has continued to be generally preferred. Perhaps, however, we have gone too far in this respect, and that it would answer the purpose when the posterior wall of the cyst cannot be dissected without too much difficulty, that it should be left in its place and made to suppurate. We cannot see, in fact, and practice is nearly silent on this subject, why, after suppuration, the walls of a wound of this kind ought to have so much difficulty in agglutinating. Only in this case I would not recommend that the integuments should be removed with the tumor;

at least we should preserve a sufficiency of them to enable us to cover the bottom of the wound. It is nevertheless true that this practice must be considered as an exception, and that unless there are particular objections, the extirpation of the entire hematic pouch ought to have the preference. The *operative process* also is sufficiently simple. If the tumor is very voluminous, we remove with it an ellipse or a star of the integuments. In the contrary case, we lay it bare by means of the simple incision, that of the T, or the cruciate. Perhaps, in such cases, the semilunar would be preferable. The tumor being concrete, enables us to isolate its envelopes without fear, and at the same time to reverse the entire sub-cutaneous layer. This first dissection being terminated, an assistant is charged with holding the flaps of the integuments apart and of making traction upon the tumor in the proper direction, while the surgeon detaches and carefully isolates it with the strokes of his bistoury from the deep-seated parts. As the hematic tumors, which may be extirpated in this way, are almost always sub-cutaneous, their extirpation is scarcely ever accompanied with serious hemorrhage. There are therefore generally but a small number of ligatures to place or arteries to tie. If the totality of the cyst has been destroyed, and the wound reposes every where on pliant vascular tissues, and the flaps have been cut of proper shape, there is a prospect of success by immediate reunion, and it ought to be attempted. Under opposite circumstances it is better to dress at first with the balls of lint, over which the flaps are to be brought, and which in their turn are to be covered with a perforated linen, plumasseaux, compresses and the simple containing bandage, until the wound has become completely cleansed and the flaps undergone all their retraction. By this means we avoid the danger of nervous accidents, purulent collections, and erysipelas, but we must be prepared to find the wound cicatrize slowly, and the patient not thoroughly cured until after the expiration of one or two months.

#### ARTICLE II.—HEMATIC TUMORS IN PARTICULAR.

Hematic tumors may develop themselves upon all the regions of the body. It is rare however, except in the superficial or deep-seated mucous bursæ, that they are distinguished, as respects the operation, from lymphatic tumors or neuromas, since everywhere else their extirpation is subjected to the same rules for the operative process that those last named tumors are.

##### § I.

Were it necessary to describe the process for extirpating hematic tumors in all those regions where synovial bursæ exist, I should have to examine those of the temporo-maxillary region, chin, angle of the jaw, the thyroid angle, spinous process of the seventh vertebra, the dorsal and lumbar region, that of the ribs and sternum, the lower angle of the scapula, the acromion, inner condyle of the humerus, the radius, ulna, metacarpo-phalangeal angles, both dorsal and palmar, the phalangeal articulations, the spine of the ilium, the great trochanter, condyles of the femur, spine of the tibia, head of the fibula, the malleoli, heel, tarsus, first and fifth bones of the metatarsus, club

feet, those with feet amputated, who are humpbacked &c.; but there are in reality no others but that of the knee and perhaps that of the malleoli, which require in this respect particular mention.

### § II.

I have in three instances extirpated hematic tumors which were situated in the mucous bursæ of the *malleoli*, in that of the outer ankle in two cases, and in that of the inner in the third. In such cases, if it is the external malleolus, we must be on our guard against opening into the sheath of the tendons of the peroneus longus and brevis muscles behind, and wounding the synovial cavity of the tibio-tarsal articulation below. The danger also of purulent inflammation in a region of this description, ought to deter us here from attempting union by the first intention, if the state of the wound or nature of the flaps do not appear to be favorable to it. At the internal malleolus we must be on our guard against wounding the sheath of the tibialis anticus muscle and the posterior tibial artery behind, and the articulation and the sheath of the tibialis anticus muscle below and in front.

### § III.—*Hematic Tumors of the Knee.*

In no place are the tumors of which I am speaking more frequently encountered than about the knee, and especially in front of the patella; nor is there any region perhaps, where their extirpation exposes to as much danger. A tumor of the size of two fists, which was situated upon the left knee, and which M. Hipp. Larrey (*Gaz. Méd.*, 1838, p. 712,) gives as an example of hematic tumor, was extirpated at the Hospital of Val-de-Grâce. The officer who was the subject of it was soon seized with general accidents and with delirium, followed by death on the eighth day. Two patients operated upon for simple tumors, one by M. Roux, the other by myself in 1825, at the hospital of Perfectionnement, died in the same way and in as short a space of time. M. Hervez de Chegoin (*Journ. Hebdom. Univ.*, t. III., p. 329,) who still gives the name of *lipoma* to these tumors, and who confesses that he does not comprehend their character, has sometimes practised their extirpation with success, but he is far from dissembling also the gravity of the operation. Extirpation performed by M. Warren (*on Tumors*, etc. p. 40) for a cancerous tumor in front of the patella, was also followed by death. It is sufficiently remarkable also that death in these cases should have resulted from cerebral phenomena and ataxic symptoms, which are scarcely explicable by the local accidents occasioned by the wound itself. I hasten to add, however, that in the great majority of cases, the operation is not followed by any unpleasant symptoms, but most usually in fact, effects a complete and sufficiently rapid cure. Six of the patients whom I have treated in this manner recovered perfectly.

*Operative Process.*—The patient is to be placed upon his back and his leg maintained in a moderate state of extension; one assistant takes charge of the foot and the other of the thigh. If the tumor has but little volume, the surgeon lays it bare by means of a longitudinal incision. In the contrary case, and where the skin is to be

preserved entire, I prefer the semilunar incision, taking care to turn its free border outwards. If the simple incision has been used, its two lips are dissected in succession, and reversed as far as to the borders of the patella. With the semilunar incision we carefully detach the flap of the integuments from without inwardly, and in such manner as to reverse it upon its base upon the inner side of the knee.

If on account of any particular reasons, we should consider ourselves obliged to give the preference to the crucial incision, we must detach and reverse its four flaps upon their base, with the same care. The same remark applies to the elliptical or to the stellated incision, with this difference only, that we should here leave a portion of integument on the apex of the tumor. In whatever manner performed, the tegumentary envelopes having been turned back, we proceed to the isolation of the periphery and deep-seated surface of the cyst. All the precautions required for this dissection, have reference to the articulation of the knee and to the diseased cyst itself, there being no large sized artery or nerve found in the neighborhood. We must therefore not forget that upon the outside, and both above and below the patella, the synovial cavity might be readily opened, and that the same remark applies to the inner side; but that directly in front there is nothing in this respect to be apprehended. In no other region also do hematic tumors exact more attention in regard to the extirpation of their cyst. However little there may remain of its posterior wall at the bottom of the wound, this cyst retards and even prevents cicatrization, and keeps up a suppuration whose consequences are not always devoid of danger. A patient whom I found at the hospital of Saint Antoine in 1828, and whom Beauchêne had operated upon two months before, retained a large purulent cavity in front of the knee. The posterior wall of the cyst left at the bottom of wound, had taken on all the characters of fibro-mucous lamellæ of a new formation, and exhibited no disposition to improve (*à la mondification*). I adopted the plan of removing it by a careful dissection, and from that moment the wound cicatrized regularly and without any difficulty. It is necessary therefore, in these extirpations, to follow exactly the line which separates the natural tissues from the thick envelope of the tumor. Should some shreds of the cyst have at first escaped from under the bistoury, we must immediately after seize them with a double erigne or claw-forceps, (see Vol. I.) and extract them before terminating the operation. The dressing also deserves some attention. The flaps having no other support to rest upon than osseous or fibrous planes, or tissues that are but little vascular, and being moreover usually very thin, should not be brought over and maintained upon the wound except by means of a very moderate degree of traction and compression. All the pieces of dressing also which are to cover them, should be sufficiently pliant, and so lightly adjusted that no strangulation may be produced either in the direction of the leg or thigh. The leg also, by placing a thin cushion under the ham, should be kept in a state of gentle flexion rather than in complete extension. At the first sign of inflammation also, it would become imperative to envelop the knee in compresses or emollient cataplasms, and to cover it with leeches and renounce every attempt at immediate union. At

a later period, and when the borders of the wound have become agglutinated and united to the subjacent tissue, but are at some distance apart, it may on the other hand become useful to place the leg in extension, and to maintain it in that manner by means of an immovable dressing. Unless that is done, the slightest flexion of the knee brings the patella between the lips of the wound in the manner of a wedge, and may retard the cure to an indefinite period.

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## CHAPTER VIII.

### CYSTS (Kystes) PROPERLY SO CALLED.

Cysts form one of the most numerous class of tumors, and have among them a sufficient number of varieties. Besides the purulent, hematic and synovial cysts, there are the melicerous, atheromatous, steatomatous and hydatid, and such as are purely serous, all of which sometimes reclaim the aid of surgery.

#### ARTICLE I.—SEBACEOUS CYSTS.

Quite a numerous order of cysts are those that are formed at the expense of the follicles of the skin. The tumors which result from them and which are generally known under the name of *maggots* (tannes, or *worms*) and *meliceris*, receive also other appellations when they exist in the form of pimples (boutons), rugosities or simple tubercles. They are frequently observed upon the scrotum and skin of the penis, and not exceeding in size a pin's head, yet susceptible of being made to yield by pressure a clot of sebaceous matter. On the face these little tumors when they inflame are called red pimples (couperose), causing very small abscesses, which are also relieved by strong pressure, after having perforated their apex with the point of a pin. But it is not with small cysts of this description that operative surgery has any particular connection. When the sebaceous matter is accumulated in greater quantity in the crypts, it distends and enlarges them to such degree as to produce tumors, whose dimensions vary from that of a pea to that of a pullet's egg. These tumors, which usually do not cause any pain, which are unattended with any inflammatory action or change in the color of the skin, and which possess a great regularity in their form, are soft (mollasses), slightly fungous and as it were semi-fluctuating. The cranium, face and neck are their most favorite localities. They are noticed also on other regions of the body. I have met with one upon the shoulder of the size of a pullet's egg; and also encountered them on the legs, thighs and fore-arms. Even the fingers themselves may be the seat of these tumors. A man in the country, whom I knew in my childhood, had upon the dorsal surface of the middle articulation of the left middle finger, one of these tumors which was of the size of a very large nut, in such manner as to form there an enormous mass which projected posteriorly. A patient of M. Fisher operated upon

by M. Warren (*on Tumors, &c.*, p. 529, pl. 16.) had one of a most singular description in front of the great trochanter. Some patients have several at the same time, and this peculiarity is principally seen where the sebaceous cysts are of but little size. It is proper however to say, that I have met with many of the largest kind at the same time upon the same individual.

The following case perhaps also belongs to tumors of this description. An officer of health in the environs of Paris, a robust man aged 55 years, had for many years in the right supra-hyoïd and parotid region, a tumor which ascended as high up as upon a line with the cheek bone and the labial opening of the mouth on the outer side of the jaw. This tumor, which when I had an opportunity of observing it in the spring of 1838, had already undergone various degrees of transformation, so much resembled an osteo-sarcoma that many experienced practitioners of the capital had characterized it as such; its extension towards the larynx below and the pharynx behind and in the direction of the mouth, had even precluded all idea of an operation, and confined the recommendations to the palliative treatment for cancerous affections. Under the impression that I recognized something fluctuating in its most prominent lumps (*bosse-lures*), and that there was also a certain mobility in the tumor, and that it presented neither the positive characters of cancer or evidence of actual adhesions with the maxillary bone, I considered it proper to lay it open freely upon one portion of it. I was enabled thereby to extract from it several ounces of a matter either melicerous, grumulous or semi-purulent, which resembled neither fibrine, pus nor tuberculous matter, nor fat or gelatine, nor the substance known as encephaloid, colloid or melanotic (*mélanique*), and which had in a word no analogy with any of the substances which are usually found in cysts.

Sebaceous matter was the only substance to which one could possibly in some respects compare it, that is to say, that this substance, unctuous in some portions of it and friable, and as it were desiccated in others, had for its receptacle a cavity whose walls singularly resembled in their papillar (*pointillé*) or cutaneous aspect that of melicerous cysts. Anxious to know what course to pursue, and wishing moreover not to influence his judgment, I confided a portion of this material to M. Donné that he might submit it to the microscope and certain chemical reagents, without having informed him of the intention I had in view. This physician, at the expiration of two days informed me, that he had found nothing but fatty matter and *particles* (*paillettes*) of *epiderm*, in the substance which I had transmitted to him, and consequently it could come only from a disease of the epiderm or of the follicles of the skin. Am I then right in concluding that the tumor in question was in reality of the description of that known as a maggot (*tanne*) and proceeding from a sebaceous cyst? Adopting the affirmative, I will add at the present time, that these cysts in breaking up (*se décomposant*) may undergo transformation of a bad character; for a patient whom I have since exhibited at the Clinique and who had a tumor of the same kind more advanced, and in the same region, was ultimately attacked with a legitimate cancer of the lower jaw. Be this as it may, melicerous cysts rebel against

all resources except those of operative surgery. When they have acquired a certain volume and remain in the chronic state, we may by compressing them upon their sides, or by dilating the little spot or black-colored hole (*pertuis*) which we generally succeed in finding on some one of the points of their periphery, and which is as it were their outlet, empty them and effect the discharge of matter resembling worms ; but they are not cured by these means. The sac soon after fills up, and the tumor is not long in re-acquiring its primitive volume. It is from proceeding in this manner, that some have been induced to believe that the disease actually consisted of worms coiled up underneath the skin. The small black point which gets out first, is taken for the head of the worm, and the sebaceous matter which threads out in an undulating line as it comes through the cutaneous aperture, completes the illusion. This has proceeded to such extent, that having presented for examination, a thread of this kind of two inches in length which I had just extracted from a maggot ulcerated below the left breast of an adult man, the interne at first and the physician afterwards, assured me it was an entozootic worm and were preparing to designate its species, when I disabused them of their delusion. Topical applications, whatever be their nature, have no influence upon this kind of worm. The merely laying them open, or exciting inflammation in them by means of a seton, acupuncture, or needles or threads passed through them, does not hinder them from being reproduced. Even their excision in certain cases does not always cure the patient. They must either be extirpated completely, or after having emptied them by a large opening, carefully cauterized throughout their whole interior. The director of one of our royal theatres, had in front of the left temple a sebaceous cyst of the size of a large bean. As he did not wish to submit to any sort of bloody operation, I confined myself at first to the evacuation of the melicerous matter by enlarging a little the opening of the tumor. The latter having returned, I laid it open with a cut of the lancet and voided it again. But it again returned, and the patient at length consented to have it extirpated.

A physician who was a member of the Royal Academy of Medicine, had at the upper and posterior part of the right orbital angle, a sebaceous cyst of an inch in diameter. It was frequently laid open in order to empty it, but the tumor invariably reappeared; he decided upon having its whole cavity cauterized, and was thus cured. In the patient who had one of these cysts on the top of his shoulder, I excised all the projecting portion of it and touched the remainder with nitrate of silver. Hardly any inflammation ensued ; the epidermic portion at the bottom of the wound sloughed off at the expiration of eight days ; the borders of the wound were not approximated, and it was the preserved portion of the sebaceous cavity which served the place of the cicatrices, and assumed the appearance and most of the characters of cutaneous tissues. In conclusion, therefore, should the cyst not be of large size, the best plan is, after having circumscribed it in an ellipse by two semilunar incisions, to seize it with an ergne and extirpate it. If the approximation of the borders of the wound and immediate reunion should be interfered with by this mode of excision, we should commence with a straight incision, whose lips

should then be dissected and carefully separated on each side, leaving intact the tumor, which should be secured with a hook, and afterwards extirpated. By this mode the operation is longer, more difficult and more painful; besides which, notwithstanding all our precautions, we most usually cut into the cyst before having completed the dissection, because the thickness of its walls can scarcely ever be correctly ascertained beforehand, and moreover, are frequently found intimately blended with the skin.

A child three years of age, had upon the right external orbital angle and in front of the temporal fossa, a sebaceous cyst of an inch in diameter. As there was a dread of any kind of cicatrix, I laid it bare by means of a simple incision. I had already isolated two thirds of it, when a movement of the little patient caused me to cut into it in front. The tractions which I was constantly obliged to make upon it to get it out, had soon emptied it, and I perceived on terminating, that there was about a centime of it in breadth left at the bottom of the wound. I touched this portion of it freely with nitrate of silver, and the cure was effected perfectly. The wife of a distinguished magistrate of Paris had under her left ear, a sebaceous cyst, slightly elongated in shape, and of the size of a nut. Desirous of avoiding the slightest trace of a wound at this part, and at the same time to make the operation sure and prompt, I commenced by seizing the tumor with an erigne, which I confided to M. Prus, the physician the family, while M. Vasseur who also acted as my assistant, stretched the integuments. By means of two incisions slightly incurvated, I circumscribed a very long ellipse of integuments, which I removed with the tumor, and which enabled me readily to enucleate the latter in front and behind, and then from above downwards, by means of the bistoury. The lips of the wound were easily approximated and the cure completed in three days without any suppuration. If on the contrary the tumor should be very large, it would be better to lay it open freely, empty it with care, and then thoroughly cauterize its whole cavity. The same process also would be suitable for cysts that are less voluminous, if there were no great danger of a cicatrix slightly deformed. Finally, the excision, or rather the amputation of the tumor, together with cauterization of its deep-seated wall, would be applicable for those which have a large base, and which cannot be extirpated entire, or which we do not wish to submit to a simple incision aided by caustic. Upon the whole, we cannot cure sebaceous cysts but by extirpating them completely, or after having excised them, making use of their deep-seated wall as a portion of integument to serve as the cicatrix. As these are a kind of tumors, however, developed in the substance of the dermoid tissue, or in the appendices and cul-de-sacs of the skin, the operations employed for them are attended with very little danger, and rarely compromise the life. Owing to their superficial position it is next to impossible in operating upon them, to wound either arteries, veins, nerves, or any important organ. As these operations, except we extirpate, do not oblige us to go as deep as the sub-cutaneous fascia, it must be only in very rare cases that they can give rise to diffused phlegmon, phlegmonous erysipelas, phlebitis, or purulent infection. Erysipelas properly so called, angioleucite, and the unpleasantness of a cicatrix more or less de-

formed, together with the pain, are the only inconveniences that can occasionally result from them.

[In America, and especially in the West India or tropical portion of it, these diseased sebaceous follicles, wherever the heat of the climate and hot sun are constantly exciting the skin, are very common, and particularly upon the face from its great exposure, and in that part most frequent upon the dorsal surface of the extremity of the nose and upon its alæ. Their enlargement is unquestionably first greatly accelerated by the vulgar practice of squeezing out these so-called worms, so accurately described by our author. Intemperate persons, addicted also to gross indulgences in indigestible food, as crude fruits, fish, &c., and those most exposed to the hot sun in warm climates, as seafaring persons, seem most obnoxious to this hypertrophy. In the remarkable case (to which I find no parallel on record) which I operated upon in Nassau, the capital of the Bahama Islands in the year 1825, and which is inserted below, the cure was complete, and there was no attempt whatever made by me to save any integuments at all, as that was in fact impossible for the great breadth of base of each tumor, as is seen in the accurate accompanying sketches taken from life by myself. The diseased parts, however, were carefully and thoroughly shaved off *en dedolant* with the bistoury, while raised up with the forefinger in the nostril, until I reached the cartilages, leaving them in this manner, in fact the whole of the nose from above the limits of the tumor, perfectly *raw*. It is in fact surprising almost, considering the heat of the climate and weather, that gangrene did not take place. The man lived many years with his new and normal shaped nose, was the object of universal remark and reference, and ultimately died of some other disease.]

TO DAVID HOSACK, M.D., F.R.S., PROFESSOR IN THE UNIVERSITY OF THE STATE OF NEW YORK.

New York, Nov. 19, 1825.

DEAR SIR,—Mr. John Russel, aged 54 years, a planter, of Abaco, one of the Bahama Islands, of robust short stature, and of sanguine temperament, was attacked in the year 1799 with small-pox, from which he recovered after a severe illness. His face remained much pitted, and the surface of the nose was particularly rough. Soon after, there was a perceptible enlargement of the teguments covering the anterior and lateral cartilages of the nose, which increased the more rapidly, as he imagined, from the practice of squeezing out of the end and sides of the nose what are vulgarly called worms, but which are well known to be the secretion of sebaceous glands, indurated and blackened externally by exposure to the air in the orifices of their excretory ducts.

Sir Astley Cooper has expressed an opinion that encysted tumors may arise from obstruction in the glandular follicles of the skin, and this may have been the first cause of the disease. It is not uncommon in the more remote and unfrequented, or what are called *out-islands* in the Bahamas, to meet with fatty tumors of small size and globular shape, upon the teguments of the forehead, nose, and cheek. I have heard them attributed, with plausibility, to the use of salt fish

and crude vegetable food. Nothing however like the gigantic growth of Russel's nose was ever seen in the West Indies, or any where described in the annals of surgery.

This patient came to consult me at Nassau, island of New Providence, about the middle of October, 1824.

For the last twenty years the nose had not varied materially from the extraordinary dimensions and grotesque appearance which the sketch presents in Plate I.

This enormous mass of disease consisted of three lobular tumors, having the appearance of a tribolate pendulous excrescence from the nose.

On examination I found them soft to the feel, and not only pitting, but exuding, on pressure, through minute and almost imperceptible pores, like those of a carbuncle, a thin, glairy, yellowish pus. For years, he informed me, he had been daily in the habit, during the warm weather, of squeezing out through these pores (which are doubtless the original orifices of the diseased sebaceous follicles) a tea-spoonful or more of matter occasionally mixed with blood. They were so movable as to be easily turned up upon the forehead, so as to exhibit the openings into the nostrils underneath, which in their natural position, hanging down upon the mouth, they entirely concealed. The middle tumor extended down as far as the lower lip, upon which it rested, interfering very much with drinking and eating, and also with articulation. This, the largest of the three, was about *two inches* in breadth, and, measuring from the anterior to the posterior surface, an *inch and a half* in diameter: the lowest part of it incurvated over the nostrils. The shape was spherical, as also that of the two lateral tumors, which were more globate, and about *one inch* in diameter. Each lateral tumor was seated upon the external surface of the ala of the nose, leaving the rim of the inferior part of the ala in its natural state, but closely adhering to the cartilage above this by a broad base nearly co-extensive with the diameters of the tumors. The middle lobe, however, involved the whole of the tip of the nose, had a larger base and attachment than the lateral lobes, and was more firmly adherent than them to the cartilages upon which it was situated. The middle tumor was also entirely separated on each side from the lateral tumors by a deep fissure, leaving each tumor upon a distinct base. These fissures had been made deeper, he said, by constantly handling and wiping out the clammy matter secreted between the tumors. The teguments upon the diseased part were of the same flushed color and rough appearance as upon the rest of the face.

The remarkable tumors upon the nose of this patient had been familiarly known for years throughout the Bahamas, as well as in many parts of the West India islands; and so extraordinary and unique were they considered, that he was in his travels everywhere proverbially designated by the cognomen of *Big-Nose Russel*. The sneering and sarcastic observations many persons had unfeelingly made upon his misfortune, had for the last ten years, he told me, almost prevented him from going abroad.

There was no pain or irritability on handling the diseased mass, but the weight of it at night was so unpleasant as to inconvenience

his respiration, unless lying on his back ; in which posture, also, the nose interfering with the mouth, would cause him frequently to spring from bed during sleep, with a sense of strangulation. The weight may be imagined from the deep wrinkles upon the forehead and around the eyes, occasioned by the incessant and powerful action of the occipito-frontalis and adjoining muscles, in their effort to sustain the tumors.

After having proposed the operation to the patient, and with much difficulty made him understand that no serious consequences were to be apprehended from it, he went home to Abaco, and in a few weeks returned to Nassau, for the purpose of having it accomplished.

In the meanwhile, the proposition I had made became generally known ; and on his return to Nassau, most of his friends, and one or two practitioners of the place, secretly dissuaded him from it, and told him that an operation of such moment rendered it advisable that he should go to London, and consult Sir Astley Cooper or Mr. Abernethy.

These recommendations, the motives for which, in several of his advisers, it was by no means difficult to interpret, had the effect which was intended ; so much so that when, after he had been at Nassau several weeks, I again suggested the operation, he positively and unequivocally declined. I had almost despaired of again bringing his mind to the resolution of having the deformity removed, until at length, on Tuesday, November 23d, 1824, I succeeded in gaining his entire assent. The operation was performed about noon of that day, in presence of Mr. Brydon, Assistant Surgeon of the Forces at Nassau, in the following manner : passing the scalpel first on the outer edge of the left lateral tumor until it was removed smoothly from the cartilages to which it was attached, then doing the same with the right lateral tumor, and finishing in the same manner, with the middle lobe ; the whole operation being completed *in five minutes*. Several large compresses were then placed over the nose across the face, secured by a bandage round the head, to check the hæmorrhage, which was not more than eight ounces. Openings were made through the compresses to admit light to the eyes. In four days the dressings were removed, and in exactly *two weeks* from the moment of the operation, the wound having (under the carbon, bark, and alcohol poultice, and tonics internally) kindly granulated by the first intention, the patient, to the astonishment of an assembled multitude, who thronged after him, appeared at the public vendue with a smooth, handsomely formed nose. The chagrin which this spectacle occasioned to those who had endeavored to defeat the operation, may be much more easily imagined than described.

On passing an incision through the different tumors, they were found to consist entirely of a dense, homogeneous, adipose or fatty substance of a white color, each containing near its centre one or more small spherical cysts of about a quarter of an inch in diameter, filled with a thick, pappy, or a *theromatous* fluid of a yellow color.

Plate II. exhibits the appearance of the face and nose after the cure.

Yours, respectfully,

DR. HOSACK.

P. S. TOWNSEND.

From the account of the case as published by me at New York, 1825, p. 1 to p. 8, inclusive. T.]

Fig. 1.



An exact likeness of Russell's Face and Nose, as taken by P. S. Townsend, M.J.  
a few days before the operation, which was on Nov. 23d, 1824.

Fig. 2.



An exact likeness of Russell's Face and Nose, as taken by P. S. T.,  
three weeks after the operation.

## ARTICLE II.—HEMATIC CYSTS.

When the unabsorbed extravasations of blood do not give rise to concrete hematic tumors, they become perverted in their nature and result in the formation of cysts which contain sometimes a melange of fibrinous clots and of a more or less yellowish-colored, red or brown serum, and sometimes concretions which have been designated as free (*libres*, i. e. loose) cartilages, and as hydatid granules and lymphatic productions, which are found floating in the midst of a more or less abundant unctuous, lactescent or diaphanous liquid; so that the whole conveys the idea of grains of barley or rice as seen in a potage, or of cartilaginous or plastic plates or bodies, or laminæ or septa, sometimes free, at other times adherent to the interior of the pouch. Nor is it rare to find the whole contents of the cysts transformed into a homogeneous liquid, sometimes of a reddish color and ropy (*sirupeux*), sometimes milky or rose-colored and of an unctuous feel, or at other times wholly serous or slightly lemon-colored.

§ I.—*Hematic Cysts in general.*

The various kinds of hematic cysts do not differ in any respect as regards the progress, duration or consequences of the tumor, but render certain remedies better adapted to some than to others.

A. Thus cysts that are purely liquid sometimes disappear under the use of *resolvent topical applications*, compresses saturated with a solution of sal ammoniac or iodine, frictions with mercurial ointment and that of hydriodate of potassa. Temporary blistering also succeeds quite frequently.

B. A remedy much more powerful than the preceding, and besides much more simple, consists in incising the cyst on some depending portion of it and emptying it completely. This being done, accurate methodical compression enables us to bring its walls into immediate contact and in this manner sometimes to obtain agglutination by the first intention. Otherwise it suffices to keep the incision open for four or five days by means of a meche (tent), that inflammation may be established within the cyst and render its agglutination almost unavoidable.

C. But the best remedy in such cases evidently consists in irritating injections, such as are employed in hydrocele. A puncture with the trochar empties the tumor without difficulty; immediately injecting through the canula of this instrument a certain quantity of tincture of iodine, in the proportion of a third of the tincture to two-thirds of water, I obtain a moderate inflammatory action, which causes but little pain and almost always terminates in the perfect cure of the cyst. Up to the present time I have not found that the tincture of iodine has produced any of those inflammatory accidents and purulent abscesses which some practitioners charge to vinous injections, eulogized, and also employed successfully a long time ago by M. Asselin, (*Thèse sur les Tumeurs des Bourses Muqueuses*, Strasbourg, 1803.) Hematic cysts therefore that are purely liquid, have no need in my opinion of excision, extirpation or caustics, and

the most they can require after resolvent topical remedies, temporary blisters, iodine injections and the simple incision, would be multiplied incisions. The cyst being well circumscribed, allows neither the liquid nor the inflammation, when the latter is moderate, from becoming infiltrated or diffused into the neighboring cellular tissue to such extent as to create the least uneasiness, while the disease may be compared in every respect to a hydrocele.

D. If in place of matters purely liquid, the cyst should contain a variety of the concrete clots which I have mentioned, there might be necessity for operations somewhat more complicated. Then, in fact, it is rare that the irritating injection and puncture, or simple incision, suffice. We might, however, make trial of one or the other of these operations, where the cyst reposes in every portion of it, in the midst of soft tissues. Emptied of the liquid matter it contains, the tumor, if afterwards submitted to compression and the action of discutient applications or temporary blisters, might possibly become concrete and transformed into a nodule that would ultimately disappear by simple resolution. In other cases, and where the cyst assumes most of the characters of synovial tissue, it would be illusory to count on the efficacy of such means.

E. In such cases, massage, also, crushing, and the sub-cutaneous punctures, might be made trial of. The fact is known, that sero-sanguineous liquids, when they once become encysted or enveloped in a sac, whether serous or fibrinous, are reabsorbed with extreme difficulty; whereas, when infiltrated into the cellular tissue, they in general readily and rapidly disappear. Every thing, therefore, goes to show, that if by massage, or any kind of compression whatever, we could succeed in rupturing the hematic cysts, we should have reason to hope for a cure. By inserting a needle under the integuments, so that it might pass obliquely and break up the sero-sanguineous pouch, we should also be enabled to force the morbid fluid to effuse itself into the neighboring cellular tissue. If we should combine with this process, compression or temporary blistering, it might also be frequently attended with success. With these exceptions, we must come to the seton and complete incision into the cyst or the multiplied incisions.

F. *Seton.*—The treatment of hematic cysts by the seton, is not a new mode of cure. Surgeons of all ages have occasionally boasted of its efficacy. We may conceive, in fact, that this means, by the inflammation and suppuration which result from it, might bring about the fusion (*fonte*), evacuation, and cleansing of the sac. The operation, then, may be compared in every respect to the one for hydrocele, by the same remedy. It is just to remark, however, that the clots, concretions, and various layers, which are then degenerated (*denaturées*) in the interior of the cyst, often prevent the seton from succeeding, and that the inflammation thus produced sometimes takes on a serious character, and but rarely progresses in a manner favorable to the cure.

G. *Incision.*—When kept up by the presence of morbid fibrinous concretions, hematic cysts would seem to demand, above all things, that they should be extensively laid open in order to extract from them these foreign bodies. Under this state of things, we should

proceed in the same way as was done in the time of Celsus in the operation for hydrocele by incision; that is to say, that after having freely laid open the tumor by means of a sharp-edged bistoury, we should empty it and thoroughly evacuate it both of its liquids and all kinds of concretions that might have accumulated there. Having thus properly cleansed it out, it is to be filled with small balls of soft lint, and then covered with the perforated linen, a plumasseau, compress and containing bandage. When the process of suppuration has sufficiently saturated this first dressing, the different portions of it are to be daily renewed, and we proceed to the end of the treatment the same as for an abscess, dressed flatwise and largely opened. This method, which is without contradiction one of the best, has, nevertheless, the disadvantage of not being applicable without danger in every region of the body. In the first place, it would be hazardous to think of it for cysts which exceed the volume of the fist, in whatever locality they might be situated. If, though, of less size, the tumor should be bridled by certain tendons, ligaments, muscles, vessels or important nerves, there would be danger in dividing it through and through. It is, moreover, useless to do that in the immense majority of cases.

*H. Multiplied Incisions.*—It is besides sufficient for the treatment of this class of cysts, to cleanse out their interior thoroughly and to create many openings for the fluid which is constantly tending to become re-accumulated in them. For that purpose I have been for a long time in the habit of treating them by incisions of about an inch in length, and which should not be wider apart from each other than an inch or two, so that I make a variable number of them according to the dimensions of the tumor. The first being made by puncture, enables me to introduce into it my finger, which then serves as a guide and support for the others. Directed through these incisions moreover, the finger enables us to detach and extract whatever there may be of a concrete or foreign nature in the tumor. In order to prevent their primitive agglutination I frequently pass from one to the other a meche of ravelled (*effilée*) linen, in form of a seton, and which I do not permanently withdraw until after the complete establishment of the suppuration. To set out from this period the disease is to be treated like a vast abscess: emollient cataplasms, and then resolvents and compresses saturated with lotions of the same nature, are the only topical applications which can now be of use. The concretions which often adhere to the interior of the cyst in the form of concentric laminæ, are fused and gradually decomposed, and imperceptibly detached and eliminated by the inflammation, and finally escape with the product of the suppuration. After the discharge of all these foreign bodies, the pus, which assumes a better aspect, diminishes in quantity, and allows the engorgement of the tumor gradually to subside, while the walls of the cyst approximate, unite together and become consolidated. It is precisely because of these concrete matters formed from the blood, that hematic cysts do not generally heal until after having been transformed into abscesses and submitted to the treatment most suitable for this last disease. The seton properly so called, and the simple incision, are of less value than the multiplied incisions, because they do not like these

last permit the immediate escape of the foreign bodies and the flow of the pus in proportion as it is formed; from whence it results that at a later period it becomes necessary most usually to superadd multiplied incisions to the seton and simple incision.

I. *Extirpation*.—Sanguineous like all other cysts, seem sometimes to be incurable except by extirpation. But this operation, which is usually long and delicate, and sometimes difficult and dangerous, is no longer admissible at the present day, unless the tumor should have undergone some degeneration of a bad character, or some lardaceous or fibro-cartilaginous transformation. If the diseased cyst could be removed in its totality, it would put it in our power to reapply the flaps immediately over the bottom of the wound, and to treat the solution of continuity by first intention. In whatever manner done, it is easily understood that this treatment would not be applicable except to tumors that were not of large size and that were sub-cutaneous or inter-muscular. Multiplied incisions moreover, which almost always succeed and which are applicable to all cases, do not exact much more time than extirpation to accomplish a radical cure. Extirpation, as respects the operative process, the danger and the consequences of every description, is upon the whole infinitely more serious, without presenting more certainty of success than the multiplied incisions, and apart from some cases of exceptions, I cannot see that it can scarcely ever become indispensable to give it the preference over the latter.

§ II.—*Sanguineous Cysts, according to the region in which they are situated.*

Every effusion of blood having the power to produce an hematic cyst, there is reason to believe that no region of the body can be exempt from this kind of tumor. Whether we examine them in general or particular, it is nevertheless advisable to distinguish them always into two great classes—cellular hematic cysts, and the mucous and synovial hematic cysts.

A. *Cellular Hematic Cysts*.—The first, that is to say, those which are formed in the midst of the cellular tissue, or external to the mucous bursæ, cannot be studied separately as respects operative surgery. I will remark only in regard to them, that every effusion of blood of this kind should be treated, for a month at least, by topical resolvents, compression, massage, crushing, or temporary blisters, before coming to operations, properly so called. Two principal reasons induce me to give this counsel: the first is, that every hematic deposit retains a certain tendency to resolution up to the expiration of the first month, and that if inflammation should not supervene, crushing and blistering succeed quite frequently; the second reason is, that in opening the sac in such manner as to admit of the air penetrating into it from without, we thereby usually excite in it an inflammation of a sufficiently bad character, which readily takes on the form of erysipelas, properly so called, or angeioleucite or phlegmonous erysipelas. At a later period, when the hematic collection becomes completely encysted, the chances of cure by simple means diminish from day to day, while the concentration of the organic lamellæ, which become approximated to each other in order to form the en-

velope to the deposit, diminish in the same proportion the dangers of the operation. The tumor now differs scarcely in any respect from those which have been established in a previously existing cyst, or in a synovial sac. As for the rest, the operations which may be made trial of in such cases, are either the pure and simple incision on a depending part of the sac, the laying of it open completely, or the multiplied incisions. Caustics, the seton, irritating injections, or extirpation, would in general be insufficient or useless in such cases. The operation, moreover, will have to be submitted to the same principles, whatever may be the region of the body to which its application may be useful; and it is in anatomy alone that the surgeon must find the rules for his conduct in hematic tumors of this species particularly.

B. *Synovial Hematic Cysts.*—When the hematic cyst has established itself in a previously existing mucous bursa, there is scarcely reason to hope for its cure by resolution after the first three or four weeks of the disease have passed by. Should there be ever so few clots or concretions in the cyst, it is almost impossible for topical applications, injections and temporary blisters to succeed, and crushing would both be of little effect and extremely difficult. In those cases, therefore, the operation, properly so called, may be proposed without waiting as long as for hematic cysts of the cellular tissue. We may easily conceive that all the mucous bursæ might possibly become the seat of similar cysts; there are, however, some in which they are developed much more frequently than in others, and so to speak, exclusively.

I. *In the head*, for example, hematic cysts have been but rarely observed in the synovial bursæ. It is not the same we shall see with the cellular cysts, (see *Hydrocephalus*.) Upon the temporo-maxillary articulation, at the angle of the jaw or on the symphysis of the chin, the incision through and through would present no difficulty, might be performed as for the opening of an abscess, and might be preferable to the simple incision, unless we should wish to recur to puncture and irritating injections.

II. The mucous bursa of the *thyroid* cartilage, and that of the diaphragm, should they become the seat of a sanguineous effusion, are to be treated in the same manner, unless the tumor shall have acquired a great volume, or the walls of the cyst have undergone a great degree of attenuation. In this last, the irritating injection, if there are no foreign bodies to extract, and the multiplied incisions, under opposite circumstances, should be substituted to the other method.

III. What I have said of the thyroid angle, is applicable in every respect to the mucous bursa of the *seventh cervical vertebra*, and that of the anterior surface of the sternum, and of the summit of the angular projections, (*du sommet des gibbosités*;) but when the cyst is established upon the sides of the spinal column, in the lumbar region, or on the external surface of the muscles, especially the *latissimus dorsi*, it is rare that the total incision of the cyst should have the preference. Supposing the tumor should consist of matters purely liquid, a puncture to empty it, and an iodine injection to inflame it, would almost always effect a cure. If grumulous products, concretions and clots of degenerated blood existed in the sac, to such extent

as to render the success of the injection doubtful, we must then have recourse to multiplied incisions and meches of ravelled linen, (see above.) Six incisions of an inch and a half each thus effected the cure of an hematic tumor which had formed between the spinal vertebræ and the upper part of the arm of a man who was admitted into my division of La Pitié in 1832. A young man who had a similar cyst at the lower part of the lumbar region, was cured of it at the expiration of a month by four incisions of the same kind. A woman, in other respects in indifferent health, and whose life has since been threatened by a diffused erysipelas, had for the space nearly of a year, between the spine and the lower angle of the scapula, a tumor, resulting from a blow, and having half the volume of an adult head. Having laid open this tumor freely on four opposite points, I afterwards passed two setons through it, which were removed at the end of a week, and nothing further has been required to complete the agglutination of the walls of the sac.

IV. The mucous bursa which covers the lower angle of the *scapula*, is quite frequently the seat of hematic extravasations. A young man formerly employed in carrying a hod, presented at the hospital of La Charité, in 1836, an instance of a tumor of this description which was equal in size to two fists. I opened it in three places, and the cure ultimately took place; but the natural mobility of the osseous angle and of the latissimus dorsi and trapezius muscles, presents in this part such obstacles to the obliteration of the cyst, that at the present time I would endeavor before all other things to produce an inflammation in its interior by means of the iodine injection, should it not appear to contain too great a proportion of concrete matters. The simple incision, to which a preference was given in the patient mentioned by Maréchal, (*Nouv. Bibl. Méd.*, t. I., p. 455, 1818,) and who had a bilobate cyst upon the shoulder, brought on a suppuration which ended in death.

V. Upon the dorsal portion of the *acromion*, hematic cysts might be treated as in the general track of the spine. Those on the contrary which form between the deltoid and the scapulo-humeral capsule, would require that we should confine ourselves to the simple incision, as I have done in two instances, or to the iodine injection. This last remark is alike applicable to the sub-tendinous cysts of the olecranon, the sub-muscular cysts of the coronoid process, and sub-bicipital cysts of the radius. Upon the inner condyle of the humerus they would require the same treatment as for that upon the spinous process of the seventh vertebra. The same would be the case for those on the styloid processes of the radius and ulna, and for those on the dorsum of the metacarpo-phalangeal articulations. But the sub-cutaneous mucous bursa of the olecranon, and the synovial cavities of the wrist, require in this respect some special precautions.

VI. *Hematic Cysts of the Olecranon.*—I have noticed in the sub-cutaneous mucous bursa at the elbow all the varieties of hematic effusions. If the effusion is in a liquid state and we are called shortly after the accident, topical applications, compression and the blister should be first made trial of. At a later period, if the tumor is voluminous and almost exclusively filled with fluid matter, puncture and the irritating injection are almost always sufficient. Should the mu-

cous cavity contain at the same time those granulations which resemble rice, barley or millet seeds, and which some persons have mistaken for hydatids or cartilages, puncture and injections no longer have the same efficacy. Multiplied incisions should then have the preference. Though exposing to phlegmonous erysipelas, they are less dangerous than extirpation and succeed full as well, without requiring so long a time for the definitive cure. If, in the place of this appearance of boiled rice or barley, the matters contained in the cyst should simply present the aspect of grumous substances, concretions or ordinary clots of fibrine, the same treatment should still be preferred.

VII. *Hematic Cysts of the Wrist.*—I do not mean under this title either the spiroidal (*spiroides*) tumors which sometimes form in the sheath of the tendons of the thumb on the outer side of the radius, or those bumps (*bosSELURES*) of the same nature which are sufficiently often noticed upon the palmar surface of the fingers upon the track of the flexor tendons of those organs; but of the kind of cyst which has for its special seat the synovial cavity in the palm of the hand and on the palmar surface of the wrist. This tumor, of which some examples are found in the ancient collections of observations, but which nevertheless has only attracted attention since the time of Pelletan and Dupuytren, has this remarkable feature, that it is divided as it were into two parts by the anterior annular ligament of the carpus, in such manner that one of these portions projects from the palm of the hand, while the other presents itself above it. Conveying moreover the sensation of a crepitation or friction of granulous bodies gliding upon each other, and a kind of fluctuation when alternately compressed at its two extremities, it is in general easily diagnosticated. Having sometimes found them filled with clots of blood, which may still be recognized though comminuted (*morcélos*) I have ultimately come to this conclusion, that the grains of which they are usually composed and which are almost always found in them to the amount of some hundreds, far from belonging to the class of hydatids, as Dupuytren believed, or to that of loose (*libres*) cartilages, as others have supposed, were in fact nothing else than fragments of degenerated (*denaturée*) fibrine or plastic lymph. Whatever may be their nature, these tumors, denominated *bisaculated* (*en bissac*) tumors of the wrist, should be first attacked by every other kind of remedy than that of the cutting instrument, especially by repeated temporary blistering, seeing that no actual operation can be employed for them without danger. The irritating injection, which would be the mildest remedy for them, if liquid matter predominated in the cyst, is without efficacy in other cases. A large seton passed from above downwards through the whole length of the sac might doubtless succeed; but inflammation so readily extends to the palm of the hand, the tendinous sheaths of the fingers and the synovial networks and cellular tissue of the fore-arm, that it becomes the source of real dangers, and sometimes proceeds to the extent of compromising the life of the patient, or at least the preservation of the limb.

What I say of the seton is applicable also to the simple incision on one of the prominences of the tumor, or to multiplied incisions,

or the laying open of the whole tumor, including in this division the anterior ligament of the carpus. I know that F. Aquapendente, Portal (*Hist. Anat.*, t. II., p. 227), Schmucker, (*Bibl. Chir. du Nord*, p. 21), Gooch (*Encyclop. Méth. Chir.*, t. I., p. 545), and Dupuytren (*Gaz. Med.*, 1830, p. 311, no. 34,) have met with success from the incision, and that Warner (*Obs. Chir.*, obs. 15 and 16, p. 88,) was enabled to divide the anterior ligament of the carpus with impunity, and thus effected cures ; but I have seen such frightful results from this method at the Hotel-Dieu and Hospital of St. Louis, that I would scarcely dare recommend it. It is to be added also, that under the most favorable circumstances possible, the walls of the cyst operated upon in this manner, cannot agglutinate without causing such adhesions and confusion of the tendons, which course through the wrist, that a deformity of the hand or of the fingers would be the almost unavoidable result. In this region then, hematic cysts are a species of *noli me tangere* ; and we should be on our guard against meddling with them so long as the patients are not greatly incommoded by them, and not until after having made trial of all other remedies, and forewarned the family of the possible consequences of such an operation.

a. As for the rest, when once decided upon, the operation which I should then advise would neither be the seton, nor the simple incision, nor the complete laying open (*la fente totale*) of the sac ; I should much prefer three or four *free* (large) *incisions* upon the principal projections of the cyst, which I would then treat as a large (grand) abscess, by emollient topical applications, local sanguineous emissions, and all the different kinds of antiphlogistic remedies. Having seen a young person operated upon by means of the simple incision, by M. Richerand, on the point of dying from the inflammation which seized upon the whole hand and fore-arm, and knowing the consequences of this kind of treatment, as pointed out by Dupuytren, I should not venture upon it but with the greatest repugnance. The two patients in whom I used multiplied incisions having got well, encourage me, on the contrary, to commend this last mode of operating, without, however, presenting it as exempt from all danger. I should add, that in a young man operated upon by me at La Pitić, in 1832, the hematic cyst though very ancient, contained concretions of fibrine and clots of blood still recognizable, but without any of those grains of which I have spoken of above. The four incisions which I made upon it above were followed by an inflammation sufficiently intense to give me at first some degree of uneasiness ; but the accidents ultimately subsided, and the cure was accomplished at the expiration of the second month.

b. A *puncture* and a *small incision* aided by compression, have also succeeded so well with M. Champion, that it is well to have recourse to it again. M. Duval, manufacturer of cotton fabrics, consulted me (says this practitioner in a letter to me,) in the year 1810, for a ganglion of a sufficiently large size, which raised up the skin in the palmar surface of the hand, and which was prolonged upon the lower third of the fore-arm, by passing under the annular ligament of the tarsus, which divided it into two bellies. Having used the bandage of Theden for the space of six weeks, without

success, I plunged a bistoury into the lower part of the tumor upon the fore-arm, which brought out more than six ounces of liquid, to which there succeeded soon after, about two teaspoonfuls at least, of small foreign bodies of the size of the eggs of the carp, and of a reddish color, and a slight degree of hardness. The compressive dressing to the hand had been reapplied before the operation, and I continued its application to the cyst, and the whole limb as high as the axilla, by means of a bandage kept moist with oxycrat and salt, cold. The incision, which at first was only four lines in length, had to be enlarged to effect a passage for the small granulated bodies. No accident took place, and scarcely any inflammation supervened. The dressing, or the roller bandage, was continued for a month, restricting it soon to the surfaces which corresponded with the disease, and the cure was complete. I operated, says M. Champion, upon a second and similar case in 1822; only that the tumor was of less size. The incision gave egress also to concretions, but in smaller quantity, and the success was the same.

VIII. *The Lower Limb.*—If the mucous bursa of the antero-superior spinous process of the ilium should be transformed into an hematic cyst, it would become necessary to attack it like that of the olecranon. It would be the same with that on the outer border of the great trochanter, and on the outer surface of the thigh. I have met with one example in front of the spine of the tibia, and which disappeared under the influence of two temporary blisters. The same took place in the case of an hematic cyst at the head of the fibula. The sub-cutaneous hematic cysts upon the posterior surface of the heel, and upon the dorsal and inner side of the scaphoid bone, the projection of club feet, and the dorsal and inner side of the first and other bones of the metacarpus, do not exact also other precautions than those of the corresponding regions of the hand. Upon the stump of persons amputated, these tumors should not be treated but with a certain degree of reserve, inasmuch as their suppuration, from their being situated on the apex of the bone, would obviously expose to necrosis. Between the great trochanter and the coxo-femoral articulation, between the gluteus minimus muscle and the same articulation, between the obturator internus muscle and the lesser sciatic notch, under the tendon of the iliacus internus muscle, upon the apex of the little trochanter, between the triceps and the rectus femoris, under the ligamentum patellæ and between the tendons of the pes anserinus, between the os calcis and the tendo achillis, where I have met with three examples, also on the plantar surface of the foot,—hematic cysts if somewhat ancient, scarcely ever yield to the application of topical resolvents, nor even to large temporary blisters. As on the other hand there is some danger of producing suppuration, they should be treated by puncture and irritating injections, provided they contain a sufficiently strong proportion of liquid matters. In the contrary case, I know not in reality which should have the preference, whether the seton, the simple or multiplied incisions, or the complete division.

IX. I have often observed hematic or sero-sanguineous cysts upon the dorsal and inner regions of the metatarso-phalangeal articulation of the great toe. In this place temporary blistering and topical ap-

plications of all kinds should be made trial of before proceeding farther. Supposing such means should produce no effect, we should not even then come to the operation, unless the tumor was in reality a source of serious annoyance to the patient. These mucous bursæ are so near the articulation, with which moreover they sometimes communicate, that we should never divide into them or lay them open, nor, in a word, carry the cutting instrument upon them unless compelled to do so. I have seen two patients upon the point of perishing in consequence of such attempts, and through means of a suppuration, which after having invaded the articulation ultimately left therein caries which rendered amputation necessary. Platner, (*Coll. Acad., partie étrang., t. VIII., p. 43*, du Discours Préliminaire; also Paul, *Suppl. à la Chir. d'Heister*, p. 50,) speaks of a ganglion of the synovial cyst of the tendo achillis, which having acquired an immense size, was followed by serious accidents, though nothing had been done to it. I saw, says M. Champion, a synovial ganglion of the same kind eight years since, in a woman aged 36; it was of the size of the fist and its form was elongated. I recommended puncture and compression, and rest for the space of a month and more. The patient more alarmed at the period of time than the operation, consulted an officer of health, who promised he would make a more speedy cure. An incision was made; and soon after a fungus formed on the inside surface of the cyst, and acquired a very considerable size, ending in the death of the patient.

X. The mucous bursa on the dorsum of the foot, which I have seen transformed into an hematic cyst in three instances, would require the same precautions, though there might perhaps be a little less danger of the inflammation prolonging itself to as great an extent as in the preceding case.

XI. The malleolar hematic cysts I have met with, have all been treated by the multiplied incisions; but it would be prudent to attempt their cure by irritating injections if they contained a large proportion of liquid matters. The neighborhood of the fibro-synovial sheath of the peronei tendons on one side, and of the tibialis posticus on the other, together with the character of the tibio-tarsal articulation, should always make us avoid as much as possible the establishment of a purulent inflammation in that quarter.

XII. It is upon the knee that hematic cysts are the most frequently met with. Those which develop themselves upon the outer or inner condyle of the femur, rarely acquire a large size, and may be treated by crushing, sub-cutaneous puncture, or irritating injections, when they have resisted both topical resolvents and temporary blistering. There will be opportunity moreover after these means, to attack them by a complete division or by multiplied incisions rather than by the seton.

XIII. Those *in front of the patella* and which are so often encountered in practice, and of which I have seen so great a number of varieties, require especially that I should allude a moment to them. In this part I have met with them of the form of a plate of little thickness, four or five inches long and from two to four fingers' width in breadth; at other times presenting a bi-sacculated appearance, or an irregularly embossed (*bosselée*) mass, or hemis-

pherical, or taking on the character of a transverse bourrelet [like a collar, T.] I have seen them of the size of the fist, though ordinarily they do not exceed that of a pullet's or turkey's egg. Sometimes filled exclusively with liquids, either viscous, or purely serous, or lactescent, and of a reddish brown or simply a roseate tint, they very often also contain clots of a fibrinous or reddish matter, still possessing most of the characters of clots of blood; sometimes simple greyish or yellowish clots that are friable, or as it were, cartilaginous and exceedingly variable in number; at other times a species of columns or movable bridles that are hard and slippery and of a cartilaginous aspect, and adherent by one of their extremities or even by both, so that in pressing them upon their exterior they convey a sort of crepitation which is sufficiently distinct and altogether of a peculiar character. The extirpation of these cysts, which MM. Pezerat (*Journ. Compl. des Sc. Méd.*, and *Bibl. Méd.*, 1827, p. 414) and Hervez (*Journ. Hebdom.*, t. III., p. 329,) still seem to prefer in adducing facts in support of it, would not become indispensable unless their walls should have acquired an extreme degree of thickness, and a fibro-cartilaginous density. In such cases we should proceed in the manner pointed out for concrete hematic tumors. When the cyst is not of a very ancient date and [its contents] almost exclusively liquid, it is advisable to commence with topical solvents, compresses saturated with ammoniacal vinegar or any other solution of sal ammoniac. The temporary blister would come in as a second remedy. I have seen a certain number of hematic cysts of the knee, which had existed over three weeks, dispersed by employing this description of remedy. [Our author (see Vol. I.) means by temporary blistering (*vésicatoire volant*) the successive application of small blisters composed as usual of Spanish flies, combinations of ammonia, &c., left on for a short time and changed in their locality. Vesication is not intended, but only a phlogosis or commencing inflammation, redness, &c., so as strongly to direct the sanguineous and other currents to the part. So far however from this temporary or transient mode of applying blisters, and which the author much insists on as an extremely valuable remedy, being a reliable one here, we ourselves have, on the contrary, found even in these largest sub-cutaneous mucous (properly *serous*, see our notes infra) bursæ, of old date, i. e., a year or more, and covering the whole patella of an adult, being like a large inverted cup, effectually cured for a length of time by means of a continuous copious drain of suppuration kept up on the dermoid surface of the tumor by thorough, repeated and full blistering, i. e. by the ordinary mode of applying this remedy. However, as I have repeated, (Vol. I.) *bursæ* of the largest description, provided their contents are liquid, and their walls and the neighboring tissues are not intensely inflamed, are, whatever may be their date, best and most effectually and radically cured by *percussion*, i. e. *écrasement* or crushing, &c. T.] At a later period we would have but little to expect from topical applications and the blister. We must then endeavor to ascertain if it is liquid matter, or concrete, that fills the synovial bursa. In the first case iodine injections would have a decided preference over every other preparation. I have made use of them on three occasions under

such circumstances, and the result has been as simple as in a case of hydrocele. The trochar being plunged in at the summit of the tumor from below upwards, while the leg is in extension, enters into the cyst as it does into the tunica vaginalis, allows us to extract all the liquid, and afterwards to inject into the cyst the medicated compound with the greatest degree of ease. Similar successes also were obtained formerly by various practitioners, and in our own time by M. Asselin, who gives two fine examples of them; also by M. Paul Guersent, as well as by M. Laugier.

The efficacy of irritating injections for cysts in front of the knee, therefore, is at the present day a point definitively adjudged. When the cyst, on the contrary, contains a sufficiently large proportion of solid clots, it is probable, though not yet demonstrated, that the injection might not be successful. The most suitable operation then, is not that of the seton; the pure and simple incision, with the introduction of a tent into the cyst, which I have done four or five times, is far from being always successful. The walls of the tumor only partially agglutinate, and the effusion generally is ultimately reproduced. The tumor returned in three patients that I operated upon, and the other cases were cured only by means of a violent inflammation, which speedily involved the whole anterior portion of the knee. It is necessary, moreover, in all cases, that this incision should be near an inch long, if we wish to have no difficulty in the discharge and extraction of the foreign grumous bodies contained in the cyst. The crucial incision also, which I have sometimes made use of, and which many practitioners have sanctioned, is an operation too serious in its consequences, and leaves a wound of too great length and too difficult of cicatrization to merit general adoption. The same may be said of excision, which was still employed by Percy or by Laurent, (*Eloge de Percy*, p. 25.) Multiplied incisions, consequently, are those to which I give the preference in these cases. These incisions being made of about an inch in length, and placed one above, another below, and one on each side, and as near as possible to the circumference of the sac, and whose agglutination is prevented by means of a meche of ravelled linen during the first four or five days, enable us to empty the sac completely, and thus create an inflammation in it, which almost unavoidably results in the consolidation of its walls. Certain it is, that the patients treated by me in this manner, have all been cured in the space of from three to six weeks. I ought, however, to add, that in a man operated upon in this manner in 1837, at the hospital of La Charité, for an hematic cyst at the elbow, the disease in consequence of another fall on this part, was reproduced in 1838. We must, moreover, not forget that sudden movements, as well as the want of proper care in the dressings, would incur at the knee more than in any other part, the risk of angioleucitis, erysipelas, and diffused phlegmons of a formidable character. I have only in three instances seen the sub-ischiatic mucous bursa, transformed into a sanguineous cyst. In this region the disease may present some difficulties in the diagnosis; but it should be submitted to the same processes of operation as in front of the knee, and the suppuration would be far less dangerous than in the vicinity of this latter articulation.

## ARTICLE III.—SEROUS CYSTS.

Under the title of serous cysts, we should, strictly speaking, comprehend all tumors consisting of a pouch, filled with aqueous liquid. We should thus designate under this name the greater part of hematoic, hydatid, and synovial cysts, as well as all serous cysts properly so called. Under the title of serous cysts, however, I shall speak only of those tumors which are independent of the natural mucous or synovial cavities, and which are constituted of an unnatural accumulation of diaphanous and exceedingly fluid liquid. All that I shall say of them, moreover, is exactly applicable to synovial cysts of the mucous bursæ, and to those tumors known under the name of *hygroma*. This description of cysts does not belong only to those exhalations, which sometimes take place in the midst of the cellular tissue, and without any appreciable degeneration. A lymphatic ganglion, or any glandular organ whatever, or the presence of any foreign substances, may become the source from whence it originates. An enormous cyst occupied the entire supra-hyoid region from one parotid cavity to the other; M. Malcolmson (*Gaz. Med.* 1838, p. 743) excised an ellipse from it below the jaw, and the liquid escaped together with a foreign body. But a kind of gland was noticed at the bottom of the sac; this gland being secured with a hook and excised, and, in fact, extirpated almost in its totality, had the appearance of belonging to the sub-maxillary gland. Was it not, perhaps, a degenerate lymphatic ganglion? at least the serous cyst was certainly dependent upon it. Marchettis (*Bonet, Corps de Medec.*, t. III., p. 239, obs. 38) speaks of a tumor of the size of a pullet's egg, situated in the neighborhood of the trachea, and composed of two cysts full of serosity, and imbedded one within the other. The author adds that there was at the bottom of the sac an excrescence which it became necessary to excise, which authorizes us in suggesting that a lymphatic tumor had been the point of departure of the disease. Muralt (*Ephémérides des Cur. de la Nat.*, dec. 2, an. III.) also speaks of serous cysts which contained either bones or other foreign bodies, as well as a pound weight of serosity. In 1838, a man came to the hospital of La Charité, who had a tumor in the scrotum of the size of two fists, with all the characters of hydrocele, from which about two glasses of a rose-colored serosity had been already extracted by puncture a year before, and which was soon afterwards reproduced. Suspecting that this cyst depended upon a degenerate hematocele, I operated upon it with the multiplied incisions. Various accidents supervened, and the patient died at the expiration of fifteen days. But this cyst, which contained more than ten ounces of a liquid almost entirely serous, was the result of an encephaloid degenerescence of the testicle, which latter, however, had only augmented to about double its natural volume. I have, moreover, seen cysts that were purely serous, form in the groin, under the jaw, and in the sub-hyoid region, in consequence of previous diseases in the lymphatic ganglions, or in the thyroid gland.

The preceding remarks were necessary to show that serous cysts are far from always constituting a simple disease, or from being all

of them susceptible of dispersion with the same certainty by the action of the same remedy. I will add, that after contusions or bruises which occasion infiltrations or extravasations under the skin, we see quite often the coagulable and coloring matter of the blood disappear, and give place to a serosity or viscous or unctuous fluid, which is almost in every respect analogous to the synovial fluid. Serous cysts, in whatever way produced, may acquire an enormous volume. According to Percy, (*Dict. des. Sc. Méd.*, t. XXVII., p. 50) Levret met with one which extended from the dorsal region to the ham. Powel, (*London Med. Jour.*, t. II., p. 144, 1785,) gives another example of one which was cured by incision, and which descended from the shoulder to the spine of the ilium. Their ordinary size, nevertheless, rarely exceeds that of a pullet's egg, or the head of an infant or of an adult, [being at the same time] more or less irregularly deformed. The shape and size of a round loaf of bread, as in the case mentioned by Saucerotte, (*Mél. de Chir.*, t. II., p. 391,) is however by no means extraordinary. These cysts, moreover, may be developed on almost all the regions of the body. All practitioners know that the free border of the lips and eyelids are frequently the seat of tumors of this kind, which rarely exceed the dimensions of a small bean, and for the speedy cure of which, all that is requisite is to lay them open and cauterize them with nitrate of silver. Jourdain, (*Malad. de la Bouche*, t. II., p. 195,) a long time since, noticed the presence of serous cysts in the substance of the lips. M. Pl. Portal, (*Clin. Chir.*, p. 289,) gives an example of one upon the lower lip. I have met with them of the diameter of an inch or the half of an egg, once on the anterior region, and another time on the side of the right parietal bone. M. Champion, (communicated by the author, 1838,) operated for one of the size of a small pullet's egg, and situated under the left temporal muscle. In Heister also (*Thèses de Haller*, t. V., p. 241, French translation,) we meet with an example of a serous cyst as large as an egg, which had developed itself under the ear. In another patient, whose case M. Champion has transmitted to me, the tumor, which was bilobate and situated between the muscles, occupied the left portion of the supra-hyoïd region, and projected at the same time within the mouth as well as below the jaw, where it was equal in volume to a turkey's egg. I have also seen, in the same situation, a similar cyst of the size of the fist, in an infant aged twenty months. In treating of the operations which are performed on different regions of the neck, I shall have to return to the serous cysts, which are sometimes produced by affections of the thyroid or of the salivary glands. The surface of the thorax is sufficiently often the seat of similar cysts. Rudolphi (*Jour. Analytique*, 1828, No. 7, p. 103,) mentions one under the pectoralis major, and which resembled a schirrus. I have also seen one which was of the size of two fists, in a boy aged fifteen years, and which being situated in front of the axilla, presented the form and other appearances of a firm and well-developed mamma. Heister speaks of a cyst of this description which was situated on the side of the spinal vertebrae; and I have frequently met with cysts on the different regions of the back, which, though of hematic origin, were nevertheless completely filled with serous liquid. Though M. Basletta (*Bullet.*

*de Féruccac*, t. X., p. 95,) was successful in curing his patient of a cyst of the size of an egg, filled with palish (pallacée) matter, and situated deep within the abdominal walls, and communicating with the peritoneum, it was not so with M. McFarlane, (*Encyclop. des Sc. Méd.*, 1836, p. 55,) whose patient died after the puncture of the cyst, which was between the peritoneum and muscles. M. Tavernier speaks of one which was situated between the abdominal muscles, and which, having made an opening into the belly, also caused death. In the collection of M. Ouvrard, we also find an instance of a serous cyst of considerable size situated upon the back. A serous cyst of the size of an orange was successfully removed by M. Pl. Portet from the back of a man aged fifty years, (*Clin. Chir.*, p. 281.) Serous cysts have been noticed upon the breech by M. Récamier, (*Gaz. Méd.*, t. I., p. 319, No. 35,) and a great number of other practitioners. I have myself often seen them in this region; but it is at the fold of the groin where they are most frequently found, and where I have met with them of the size of a child's head.

M. Jaudard (*Thèse*, Strasbourg, 1816, p. 14, obs. 4) states that he saw one at Lyons in the service of M. Bouchet, which was situated about the middle of the inner part of the thigh. That mentioned by Paroisse (*Journ. Gén. de Méd.*, and *Dict. des Sc. Méd.*, t. XXII., p. 133,) occupied at the same time the thigh and the leg. I have often had occasion to meet with them on the different regions of the arm and fore-arm, on the body of the thigh and leg, and on the foot and hand. All the *operations* I have described for hematoic cysts, are applicable to those that are serous. Leaving aside what relates to the employment of topical applications, compression, blisters, and even caustics, I would remark that crushing and puncture with the needle would not succeed, except in certain cases, and should not be had recourse to unless it should be impracticable to make use of irrigating injections. This last means, in fact, especially if tincture of iodine be employed, is so perfectly simple and of such unfailing efficacy, that it should be preferred in every case where no particular operation would forbid its employment. Should the cyst not be very large, we should make use of a very delicate trochar and a syphon-syringe corresponding. In other cases we should proceed in the same manner as in the operation for hydrocele, and should succeed equally well. Supposing, however, whatever the reason may be, that we do not wish to make trial of this remedy, an opportunity would then present for puncture or the simple incision of the cyst: this sometimes suffices to bring on inflammation, suppuration and a definitive cure. A woman of 45 had in the left groin a tumor with thick walls, slightly *bosselated* (*bosselée*\*) on its surface, of the size of the head, but without ever having caused her any pain. This woman, who had been addressed to me at La Charité, had her tumor punctured by M. Vidal, who took from it two glasses of a limpid serosity. Finally, a purulent inflammation established itself in the

\* We shall venture on the coining of this word, as *bosse* and *bossel* (from whence *embossing* in English—i. e. sort of *basso relivo* or fret-work in the ornamental arts), are not translatable with precision, certainly not with elegance, by bumps, lumps, bunches, bumpy, &c., although they may rudely convey the idea of the inequalities, or elevations and depressions meant. T.

sac, and the pus opened for itself an outlet through the puncture which had caused it. The tumor was reduced little by little, to the volume of a pullet's egg. Seeing that the process of resolution was suspended, I considered it to be proper, before having recourse to a complete division of the sac, to make trial of a large temporary blister. Eight days after, the walls of the sac were found completely agglutinated, and the patient soon after demanded her dismissal from the hospital, being in a state of perfect cure. If however puncture or the simple incision should seem insufficient, we should come to the complete division of the tumor, should it not exceed a small egg in its size, or in the contrary case, insert through it one or several setons, or better still, divide it on several points of its free portion by means of large incisions. As to extirpation, it is neither more efficacious nor more certain in its effects than the preceding method; and as it is obviously the most dangerous and most difficult, and the longest of all, it would be advisable in general to reject it. Up to the present time I have not used the iodine injection for curing serous cysts, except in the boy who had one on the outer side of his breast, and in the infant who had so vast a one in the supra-hyoid region; but these two examples have satisfied me that a remedy like this will succeed in at least fifteen cases out of twenty, and that it should be made trial of before all others. Serous cysts developing themselves external to the natural organs and cavities, cannot be examined in a topographical point of view. The operative process which relates to them should consequently be submitted to simple general rules, whether it be crushing, puncture, injection, the seton, incision, or multiplied divisions, or finally excision of all its most attenuated portions, or its extirpation, when it is of too large a size to allow us to hope for perfect agglutination of its walls. Among serous cysts there are some that are multilocular [i. e. having several compartments, T.] or truly hydatid. In such cases we should have to qualify what I have said of irritating injections and the different kinds of incisions. It would be next to impossible here to look for a radical cure by means of the seton, the simple incision, or even the multiplied incisions, unless the operation, perchance, should include all the vesicles of the cyst. To operate then in such a case with any chance of success, it would be necessary to lay open the tumor throughout all the compartments (locules) of which it is made up, or to extirpate it entire. An hydatid cyst which existed in the iliac region was successfully extirpated by M. McFarlane (*Encyclop. des Sc. Méd.*, 1836, p. 54), and M. Colson (*Rev. Méd.*, 1827, t. IV., p. 33) found one of this description between the bladder and the rectum. Whether the tumor in this respect, in reality contain hydatids, or is composed purely of serous receptacles (vacuoles), the indication, notwithstanding, will be the same. It would only be a loss of time to attempt the other operative methods described farther back, and which, besides their little efficacy, would expose to real dangers.

#### ARTICLE IV.—SYNOVIAL CYSTS (NODUS-GANGLIONS).

Tumors known under the title of synovial cysts, were formerly designated by the name of ganglions or *nodus*, and it is these, which

people in general call *thickened, knotted or twisted* sinews, [nerfs foulés, noués or tordus—sometimes “weeping sinews.” T.] Developing themselves in the neighborhood of the joints, or upon the track of the tendons, these tumors rarely exceed the size of a nut or egg. All of them appear to consist of a sort of cul-de-sac or hernia, or appendix to the natural synovial cavities, whose neck (collet) had been obliterated from some cause unknown. They may be divided into two classes: 1. Articular synovial cysts; and 2. Tendinous synovial cysts. Nothing, however, is so variable as the development and progress of such tumors. Moinichen mentions having seen them disappear on the approach of parturition, and afterwards re-assume their primitive volume. M. Champion mentions having seen one which shrunk for several years successively, every two years, about spring-time; but it appears in this case, that the shrinking of the cyst was owing to the accumulation of the liquid producing a crevice. We may conceive that the disease then acts similarly in fact to a hydrocele, which has been accidentally ruptured, and is soon after reproduced. As synovial cysts do not ordinarily cause any pain, many patients will carry them all their lives, without applying any remedy or paying any attention to them. I have seen a woman fifty years of age, who had three of them about the abductor and extensor tendons of the thumb for more than twenty-five years. I have seen others at the dorsal region of the foot, about the knee, and on the track of the different tendons of the hand, which had existed to full as great a length of time, without the persons who were afflicted with them, ever having thought of applying any remedy to them. I should, in fact, add that many of these cysts ultimately, in the course of time, disappear spontaneously. They are not to be attacked by surgical means therefore, unless by their volume or relations, they produce either deformity, inconvenience or pain, or functional disturbance to such extent as to induce the patient to incur the risk of the operation.

### § I.—*Various Means.*

Nothing also, is more variable than the treatment for this description of tumors. M. Ch. H. (*Encyclop. Méthod.*, t. XIII., p. 617, col. 2, 1832,) had a ganglion of the size of a small nut, on the flexor tendons of the left ring and middle fingers. Having, in vain, consulted most of the distinguished physicians of Paris, the patient, who put himself upon the use of the muriate of soda, of which he took from two to three ounces a day, in this manner effected a radical cure. Gilibert (*Rousset, Thèse de Strasburg*, 1812, p. 6,) says he has seen a case of this kind in which satchels of plaster, or leaves of lavender, succeeded. Frictions with aromatic, mercurial and camphorated mixtures, laurel oil, soap and water, saliva, resolvent plasters, hard and repeated rubbings and baths of sulphur-water, equally appear to have been followed by some successful results. Dupuytren, according to M. Bouboucki, (*Thèse*, Paris, 1828, p. 25,) dispersed a synovial ganglion in the ham, by means of the simple *douche*. But were it allowable to make trial of such remedies, it would be puerile to count on their efficacy, unless in some very rare exceptions.

### § II.—*The Temporary Blister,*

Or even one that is permanent, would deserve infinitely more confidence. Jæger, (*Dict. de Chir.*, t. I., p. 526,) who made use of them for cysts at the knee, asserts that he obtained positive advantages from them. I have elsewhere published (*Archiv. Gén. de Méd.*, 1826,) the case of a synovial cyst on the posterior region of the wrist, which disappeared under the action of two large blisters, though it was of very ancient date, and of the size of half an egg. I have often succeeded with the same remedy since, in similar cases. A lady, who had one of the size of a large nut, on the dorsum of the foot, opposite the calcaneo-cuboidal articulation, and who would not hear to an operation, was also cured by means of large temporary blisters and resolvent frictions, and compression. Though I might cite at least as many as ten analogous facts, I ought, however, to remark that most synovial cysts will not yield to this therapeutic.

### § III.—*Moxa.*

*Moxa*, which has already been made trial of for a cyst of the wrist by M. A. Severin, (*Méd. Efficace*, p. 550, § 1998,) and which M. Champion also says he has used with success in a patient who would not submit to any other means, would not probably be any more effectual, and has too many inconveniences in itself ever to become the favorite remedy for this disease.

### § IV.—*Caustics.*

Though the employment of caustics may have succeeded with F. de Hilden (*Centurie 3*, obs. 79, or p. 72; obs. 44 of the French translation,) in curing a synovial cyst of the carpus, and an arsenical application have been equally successful with Woolam, (*Annal Muyskezas*, t. III., p. 490, 1811,) such remedies, nevertheless, have in all epochs inspired the most vivid apprehensions. Dalechamps (*Chir. Franaise*, p. 158, in-4°; p. 910, in-8°, 1570,) relates that a patient, with synovial cysts on the dorsum of the hand, who was treated for them by caustics, did not recover until after having experienced very severe inflammatory accidents. It is moreover evident that this kind of operation, would be exposed to all the consequences to be apprehended from a cutting instrument, without having its advantages. Their uncertainty and the deformed cicatrices which they would necessarily produce, will always be sufficient to proscribe their use with the generality of practitioners.

### § V.—*Compression.*

One of the remedies against synovial cysts which has been most extolled is compression; the ancient authors had already noticed it. La Vauguyon (*Traité d'Operat.*, p. 627,) recommends that it be made with a plate of lead, and that frictions be associated with it. This plate of lead, adjusted by a pelote and circular bandage, has been proposed anew by Marigues and Testat. (*Malad. Chir.*, 1786.) Theden, the great admirer of compression, says that by means of

this, with lotions of the arquebusade water, he cured a synovial ganglion in the space of six weeks. New facts also in favor of this remedy have been brought forward during the course of the present century, by M. Balme (*Dissert. an. X.*, p. 39,) and M. Godele, (*Rev. Méd.*, 1831, t. I., p. 19.) It is nevertheless true that compression alone rarely succeeds with synovial cysts, and that in order to obtain any cures from it, it would be necessary to apply it with such force and to continue it so long a time, that in reality it scarcely deserves to be made trial of except as an auxiliary to other operative methods.

### § VI.—*Crushing, (écrasement.)*

A more efficacious remedy, and one which surgeons have in their pride erroneously associated with the practice of vulgar people or charlatans who itinerate about the country, is that of crushing the cyst. This remedy, which at first sight appears so rude, had already been employed in the time of Philagrius, (*Peyrilhe, Hist. de la Chir.*, p. 702,) Chaumète, (*Enchiridion des Chirurg.*, ch. 3, p. 122, 1560,) and Forestus, (Bonet, *Corps de Méd.*, t. III., p. 60.) Muys (*Decad. 2, obs. 8*, p. 127; *Nouv. Obs. de Chir.*) armed with a leaden palette, cured in this manner a cyst at the wrist, and similar successes were obtained by Ledran (*Consult. de Chir.*, p. 257,) and by Godele (*Rev. Méd.*, 1831, t. I., p. 17.) I have, says M. Champion, often crushed ganglions in the palms of the hands, by means of the thumbs crossed, or by a single thumb; but there is a good number of them that will not yield to this kind of pressure. This practitioner, who agrees in this with Heller that crushing is very uncertain, almost always uses a mallet and a piece of pasteboard cut in the form of a shovel. A single stroke properly applied ordinarily answers in such cases. This compression [rather *percussion*, T.] astonishes much more than it does harm. On the carpus and the tarsus it has never, says M. Champion, failed. A man who swooned away immediately after the stroke, confessed subsequently that it was from fear. This process, which the rebouteurs (rebouteurs) and peasants have employed from time immemorial to *untie the tendons*, requires that we should place the limb upon a solid support while making the stroke with the mallet, and that the cyst should afterwards be properly compressed during some fifteen days. I have often in my boyhood, seen peasants in the country strike the fist violently upon the wrist, and in this manner cure synovial cysts of the hand. I have seen others who did the same thing on the foot, and I should add, that unless there be a very considerable degree of muscular force exerted, we fail in most instances when we attempt to crush by the thumbs alone. This crushing [or sudden rupturing or bursting of the sac, T.] is in short an operation to be made trial of. It is, however, exposed to two inconveniences; sometimes there results from it an inflammation sufficiently acute, and I have seen three patients in whom it was attended with such accidents, that a vast suppuration was established in the limb, and their life for a long time kept in jeopardy.

When every thing goes on naturally, the tumor retains a great tendency to be reproduced; more than half of the synovial cysts which I have treated, or caused to be treated in this manner, have

returned at the end of some weeks, or some months. We should, however, render success more certain by associating with this remedy repeated temporary blistering, resolvent frictions, and compression for a long time continued.

[We refer the reader for the advocacy we have made of this invaluable resource of *sudden and powerful percussion*, to what we have said above of these bursal cavities or cysts, when they contain other than pure synovial fluid—to which the author here confines himself. Also to our remarks in Vol. I., and also infra, on the same mode of treatment. The cases in which we have used it, and we never employed any other remedy, were of the character of synovial cysts proper, in their normal state, so far as they were unchanged in structure and containing their normal sero-synovial fluid, only accumulated in abnormal quantity, therefore literally, as by the vulgar name, a weeping ganglion. In every case the blow made with great rapidity and force, by a heavy book held in both my hands, and at the height of two feet above the tumor as the limb lay firmly stretched on the table, I succeeded in perfectly and radically curing the disease, in an instant. The tumor entirely disappears under the blow which crushes it, so that the deformity, as if by magic, leaves thus the smooth natural plain surface of the skin. In one of the cases at the olecranon, where it appeared somewhat bosselated, the disease returned partially in a few weeks, but a second blow completed its extinction. In a very recent case, the tumor being of the size of a small nut and on the ulnar side of the dorsal surface of the radius, about two inches above the wrist, (caused in a stout young Irish porter from lifting heavy trunks,) and resting, in fact, partly on the interosseous space, I was enabled, by proper pronation, to bring the tumor on to the edge of the radius, and by this means procure a solid osseous point d'appui. I would recommend this course of pushing the tumor where it can be done, on to a bony plane, before the blow is struck. This I advert to, because I believe it practicable, in most instances, on the dorsal surface of the metacarpus, where the tumor lies on an interosseous space. In one such case I recommended it to a very bold practitioner, who nevertheless pursued his own course, opened the sac and caused a severe, if not dangerous inflammation. In striking the blow, it must be done with a good deal of force and with a heavy quarto book for example. In the cases of our author, whenever the disease returned, he was perhaps too sparing in this respect, towards his patients. This beautiful illustration of sub-cutaneous or sub-muscular, or even sub-aponeurotic surgery, (for I should consider a synovial tumor beneath an aponeurosis, provided the tumor could be made to rest on bone, equally curable by this mode,) excludes effectually every other treatment, and for myself, I never saw the slightest accident supervene from it. Nor have I found the least degree of compression necessary after the *ecrasement*. T.]

#### § VII. *Sub-cutaneous Puncture.*

Some surgeons, having confidence in the rupture of the sac, and experiencing some difficulties in effecting it, have proposed to introduce obliquely under the skin a cataract needle, and thus puncture

the little synovial pouch so as to allow of expelling its contents and forcing them to become infiltrated into the neighboring cellular tissue. M. Cumin, (*Journ. Univ. des Sc. Méd.*; *Journ. Analytique*, t. I., p. 367, Nov. 1827; *Bull. de Féruccac*, t. XIV., p. 225; *Arch. Gén. de Méd.*, t. XIV., p. 252,) who appears to have been one of the first to suggest this operation, recommends with reason, that we should make use of compression also after having emptied the sac. I have attacked in this manner a synovial cyst on the dorsum of the foot, another which was situated in front of the malleolus externus, and similar tumors on the back of the hand and wrist, without ever having obtained a single radical cure. The tumor was emptied and the sub-cutaneous layer of the neighborhood became slightly oedematous; but the cyst soon filled again and the disease reappeared as before, whatever M. Roberts (*Journ. des Progrès*, t. XII., p. 258; *Rev. Méd.*, 1829, t. I., p. 299) may say on this point. To obtain any favorable results from this means therefore, it would be necessary to associate with it not only compression, but also temporary blistering and resolvent frictions.

### § VII.—Seton.

*Puncture*, and the abstraction of the liquid by means of a syringe or gum-elastic bottle, as recommended by Monro (*Ancien Journ. de Méd.*, t. LXXIX., p. 138,) would be at the same time more difficult and also still *more uncertain*. The seton, which has been employed by quite a great number of practitioners, and which is mentioned by M. Ch. L. (*Encyclop. Méth.*, t. XIII., p. 618,) and also by M. Cooper, is considered by others (*Journ. de Méd.*, t. V.) as calculated to induce a cancerous degenerescence of the ganglion. At the present time the seton might be made trial of under a form less dangerous. One, two, three or four simple threads passed through the tumor, as has been said of *Erectile Tumors* and *Varices*, and withdrawn after the lapse of some days, would probably be sufficient to create a moderate degree of inflammation in the cyst, and to effect its resolution. But how could we then avoid one of two inconveniences, a purulent inflammation which would not be unattended with danger, or too slight a degree of irritation, which would prevent our succeeding? Without, therefore, absolutely condemning this remedy, we ought not to repose too much confidence in it.

### § IX.—Irritating Injections.

Irritating injections, though made use of by some practitioners, have, however, always excited some apprehensions when about to be employed for synovial cysts. The inflammation which it is proposed to excite by them, has been considered dangerous, in consequence of the neighborhood of the articulations. It is true that some accidents have resulted from them; that a woman on whom they were used and who came to the hospital of the Faculty in 1824, was seized with all the symptoms of a phlegmonous erysipelas on the dorsum of the hand, where the cyst was situated, and on a portion of the dorsal region of the fore-arm; but, I do not think that the subject has been sufficiently examined. The synovial cysts are *legitimate serous cavities*; [see note infra, where the propriety of thus

giving the name *serous* rather than *mucous* to the various *bursæ*, is well sustained. T.] Every thing leads to the conclusion that an irritating liquid would produce an adhesive inflammation there, as in the tunica vaginalis. Provided this injection was made through a simple puncture, and not pushed to the extent of tearing (*érailler*) the cyst, and of becoming infiltrated into the cellular tissue of the neighborhood, we cannot see what evil consequences would result from it. The phlegmasia thus produced under the skin, should it extend even to the articulations, is not comparable to ordinary inflammations, or such as are produced by the action of some internal cause or external violence. Perhaps, also, the irritating injections have sometimes been followed by unpleasant consequences, because of the quantity or nature of the liquid made use of. Certain it is, that the tincture of iodine, which may be introduced in moderate proportions into every serous cavity, and which seems to have the power of infiltrating itself, at least partially, into the cellular tissue, without producing gangrene, has hitherto enabled me to obtain a number of cures which, by their simplicity, have been moreover of the most encouraging description.

A man aged from 30 to 35 years, had on the dorsal surface of the tarsus a synovial cyst of half the bigness of an egg; I punctured it and drew out about two spoonfuls of a serous liquid. Two gros of tincture of iodine diluted, were injected in their place, and every thing went on with the same simplicity as in the operation for hydrocele. The same operation performed twice on ganglions of the wrist, once below the external malleolus, and in another instance on the dorsum of the hand, have been followed with the same satisfactory results. I have seen it fail, however, in a man who had a synovial ganglion on the dorsal surface of the foot; but here the cyst was filled with gelatinous matter, and the injection caused no appearance of inflammation or reaction. In conclusion, therefore, it would seem, that irritating injections, and especially tincture of iodine, should be employed wherever the cyst is of a certain volume, and is found filled with matters purely serous. I would remark only, that they should be punctured with a small trochar, and not with the bistoury, and that a certain quantity of the tincture of iodine injected should be left in their interior.

#### § X.—*Incision.*

Like all other cysts, synovial ganglions may be treated by simple incision. Fabricius ab Aquapendente had already obtained cures by this operation, which is also extolled by Portal (*Hist. Anat.*, t. II., p. 227) and Schmucker (*Bibl. Ch. du Nord*, p. 21.) Nevertheless, practitioners of the present day do not resort to it but with repugnance. All the dangers imputed to irritating injections, are equally applicable to this. It produces, in fact, one of two things: either the small wound immediately shuts up without causing inflammation, and then the tumor soon reappears, or the interior of the ganglion becomes inflamed and is transformed into abscesses, and in this case we have reason to fear the extension of the phlegmasia under the form of phlegmonous erysipelas to the sub-cutaneous cellular tissue of the neighborhood, and even to the articulations that are situated nearest

to the tumor. The force of these objections cannot be denied, and in this respect the incision is certainly more dangerous, without being more efficacious, than irritating injections. Without inflammation it cannot succeed; with inflammation it causes pus, and purulent inflammation, in the vicinity of the articular synovial cavities, is always a formidable phenomenon. I would not, therefore, employ this means but for synovial cysts of a small volume, and for those which in place of matters purely serous, are filled with substances of a gelatinous (*gélatiniforme*) and semi-concrete character. I nevertheless admit, that the simple incision sometimes succeeds, and that it is far from being always attended with the dangers of which I have just spoken. As for the rest, I should prefer, should I decide upon it, to divide the tumor through and through, rather than limit myself to incising it only on one of its points.

### § XI.—*Extirpation.*

The remedy which has the greatest certainty, and which in every epoch has engaged the attention of practitioners, is extirpation. There is no doubt in fact that it is the most positive resource, and which precludes all chance of a return of the disease when applied to synovial ganglions. Unfortunately it is a remedy which alarms most patients, one also whose employment is not always devoid of difficulties and which may involve serious dangers. Thus to extirpate a cyst of this description, it is necessary to lay it bare by a simple, a semilunar, a T, or a crucial incision, then to go through a delicate dissection in order to isolate it from the organs which surround it, and thus remove it entire. The operation may in consequence be long, painful and sufficiently laborious. There results from it, moreover, a considerably large wound, whose suppuration it is often impossible to prevent. Finally, by operating in this manner we run the risk of opening into the synovial and articular capsules, and thus paving the way for the introduction of purulent phlegmasia even into the interior of the joints. It is nevertheless true that the dangers of this extirpation have been greatly exaggerated. I have performed it four times on the dorsum of the foot for ganglions which were of the dimensions of the thumb in diameter, a French chesnut, (*marron*), a large nut or the half of an egg. The cure in three of my patients was speedily accomplished. The fourth, who was a young girl of nineteen years of age, continued to be threatened with a phlegmonous erysipelas during the space of a week; but sanguineous emissions and topical emollients put a term to the accidents, and the cure notwithstanding was completed at the expiration of three weeks. I have removed similar cysts from the inner as well as the outer side of the knee. I have extirpated one also which was situated immediately above the head of the fibula. I have treated them many times in the same way on the dorsum of the carpus and metacarpus, and out of twelve or fifteen operations of this kind which I could enumerate at the present day, there is not one of them that compromised the life of the patient. After the example of Celsus and Paul of Egina, so also have Warner, Gooch, Eller, Schmucker, (S. Cooper, *Dictionary*, t. I., p. 526,) and Heister, (*Thèses de Haller*, t. V., p. 262, French translation,) related successes obtained by means of extirpation, an operation which

Chaumète, (*Enchiridion*, etc., p. 123,) and Friesse, (*Thèses de Haller*, t. V., p. 243, French translation,) equally eulogize. In 1800, says M. Champion, when I was studying medicine, I extirpated in a young coquettish woman, a ganglion of the size of an almond, situated on the extensor tendon of the middle finger of the left hand. An inflammation supervened and gave rise to three abscesses. After the cure the young lady retained a stiffness in the movements of the hand, and this lesson has taught me not to repeat the operation. Nevertheless, a young physician of my acquaintance, adds the same practitioner, has extirpated one of less size, also situated on the metacarpus, and which I refused to operate upon, preferring to wait until it should become larger that I might burst the cyst; but no accident followed the operation. Synovial cysts situated on the thumb, carpus and tarsus, have also been removed without danger by M. Pl. Portal, (*Clinica Chir.*, pp. 298, 301, 303, 307.) I would however remark, that I now regard it superfluous to dissect such tumors with so much care; that I arrive at the same result with infinitely less difficulty or pain to the patient by confining myself to opening or cutting freely into the whole sac, which I immediately fill with balls of lint to induce it to suppurate, and afterwards treat it in every respect as an abscess. The operation is then remarkably simple, and I have satisfied myself that it will obtain a cure as prompt and certain as extirpation of the cyst, properly so called. As to the *ligature*, it is unnecessary to repeat that pediculated synovial cysts only would allow of its employment, and that it would expose to more pain and danger than any of the operations which have been described, especially the irritating injections, without being attended either with their advantages or simplicity.

### § XII.—*Recapitulation.*

To sum up, therefore, synovial ganglions when it is deemed advisable to attack them seriously, should be treated by topical resolvents when they are still recent; by temporary blisters when they are already of ancient date; by permanent compression where the blister and dissolving pomades are without effect; by crushing with the thumb or mallet where ordinary compression does not suffice; by sub-cutaneous puncture where crushing is unavailing or inapplicable; by iodine injections, by preference wherever they are practicable; and by large openings or the complete incision in cases that are most obstinate or complicated. So that I reject as useless or dangerous, extirpation, simple incision, caustics, the ligature, and even vinous injections.

### ARTICLE V.—OSSEOUS CYSTS.

We find in the annals of science some cases of tumors composed of osseous shells, in other respects independent of the bones and periosteum, and containing matters sometimes concrete, at other times liquid. I have met with these tumors on the breast, scrotum and shoulder, on the parietes of the thorax, certain regions of the cranium, and on the face and limbs. M. Tassery (*Annales du Département de l'Eure*, pp. 219, 220, 1810,) speaks of a cyst with osseous walls, which was situated on the hand, and which contained

about two pounds of cartilaginous substance, and the exsection of which was effectually accomplished by means of a saw. The osteofibrous tumor removed from the cheek of a young man by M. D. Lasserve (*Cas de Chir.*, &c., p. 27), caused the wounding of the canal of Stenon, and appears to have originated in the salivary duct. M. D. Lasserve (*Ibid.*, p. 41, fig. 4) has also given the figure of an osseous tumor which was as large as an egg, and while disconnected with the osseous system, occupied the middle of the upper lip of a young man aged twenty-five years. It will be however when treating of tumors of the face and breast, that I shall speak of the operations applicable to this description of cysts. I will remark here only in respect to general rules, that excision and extirpation are the only operations applicable to such tumors; and that we ought consequently to proceed in the same manner for their removal as for the extirpation of a lipoma, lymphatic tumor, neuroma or hematic tumor. It is moreover obvious, that topical applications, the seton, compression, injections, and excisions, properly so called, could have no chance of success, and that before every other consideration the osseous or osteiform plates should be removed in their totality, if we expect to obtain a radical cure in patients who have, these osseous cysts.

[One of the most remarkable *osseous* formations but *not* of this description, occurred in an old man aged about 75, a sailor, of tall and robust form, and a patient at the Seamen's Retreat while I conducted that establishment. He was of intemperate habits, and the result of his indulgence in this respect was one of those old *rum legs* or extensive oedematous ulcers on the calf and below, which served as a drain to his plethoric condition. In a fit of depression of mind he threw himself from the piazza of the third story of the hospital, and thus caused immediate death. In the dissection, besides various extravasations which it caused in the brain, *every rib* on one side was fractured, and on examining the diaphragm we found in its substance near the centre, a *circular osseous plate* precisely of the size and thickness and shape of a dollar, which lay in the same horizontal plane with the diaphragm and in the midst of its tissue, as if inserted or sewn into that part. It did not appear during life that this formation had in the least interfered with the respiratory functions. T.]

#### [CARTILAGINOUS AND OSSEOUS TUMORS.

*Mediastinal Tumors—Carcinomato-cartilaginous Tumors.*—An extraordinary case of this kind, and of which the specimens are preserved by Mr. Adams, and were by him laid before the Pathological Society of Dublin, occurred in the practice of Dr. Cullen of that city, in 1839 (see *Dublin Review*, 1840), in a woman aged 40, who had been married two years but was without children. She had had for some time great difficulty of respiration, with violent but *dry* cough, and especially paroxysms of suffocation at night. The bruits of the chest were normal. The left hand and face were oedematous, and the veins of the neck and face livid and distended during the violent paroxysms of coughing. In three or

four weeks the left arm, and then the right, and finally the lower limbs also became œdematos. Finally, she was obliged to sit up constantly to get breath, and the neck began to swell enormously and to become inflamed immediately above the sternum. Death soon followed, when there was found in the situation of the thymus, in the anterior mediastinum, an oval whitish tumor near three inches long, of a carcinomatous structure, and in some places cartilaginous and cerebriform, which tumor inclined at its largest extremity to the left, and was adherent in part to the trachea and arch of the aorta. The inclination of the tumor to the left causing it to press on the vessels of the neck and shoulder on that side, explained why the œdema was greatest in that region. The heart, aorta and pulmonary artery were sound; also the air passages and lungs, except that the latter were emphysematous, no doubt from the continued violent paroxysms of coughing. This instructive case shows the importance of tumors in the thorax as connected with the difficulty of diagnosing substernal and thoracic aneurisms and pulmonary disease.

A still more remarkable case of tumor in the anterior mediastinum was published the same year as having occurred in the practice of Dr. J. M. Neligan, (*Edinb. Med. and Surg. Journ.*, April, 1840,) in a man aged 21, who in April, 1838, was attacked with difficulty of respiration, cough without expectoration, slight pain in the chest, &c., as in the above case. Finally, a tumor showed itself above the sternum, and the symptoms became aggravated, with orthopnea, swollen veins of the face and neck, suffocating paroxysms, and cold extremities, ending in death in less than a month from the attack. The lungs, bronchi, and trachea, were, so to speak, perfectly sound, and also the heart and its vessels, and some transparent liquid was found in the pleural cavities. We perceive the thoracic viscera were sound, notwithstanding the tumor had the enormous magnitude of 14 inches in length and  $4\frac{1}{2}$  inches in breadth, and had filled the entire anterior mediastinum, with firm adhesions in front to the posterior side of the sternum, and behind to the pleura and pericardium, while above it crowded the thyroid gland upwards and had even contracted firm adhesions also as far down as with the diaphragm below, and had extended laterally on each side to the articulations of the cartilages with the ribs. This case still more strongly points out the importance of close discrimination in diagnosing morbid structures in the thoracic cavity.

*Cartilaginous Tumors of the Face and Scalp.*—But one of the most singular complications of tumors perhaps on record, is that of an unmarried woman, aged 52, as related by Mr. Ancell (*Medico-Chirurgical Transactions*, vol. XXV., London, 1842, 8vo. See also *British and Foreign Medical Review*, Jan. to April, 1843, vol. XV., p. 153, 154.) The disease first appeared when she was 14 or 15 years of age, and the greater part of her *face and scalp* was loaded with *solid tumors* of different sizes. Those on the scalp externally were of a very florid color, smooth, glassy, and denuded of hair, and varied in shape from a nearly globular, to an irregular, flattened spheroidal form; among them were a few perfectly round and of a violet hue. Some were sessile on broad bases, others suspended by

short thick peduncles. One of these latter was removed, and when divided showed a smooth shining semi-transparent texture of a very pale pinkish hue and of a *nearly cartilaginous* consistence. It appeared homogeneous except for a few vessels ramifying through it. The investing skin was much more vascular. Among those on the face were interspersed also a number of lenticular tubercles arising from hypertrophy of the dermis, and some also smaller which were follicular elevations. The tumors sometimes itched and were painful when pinched, but were generally free from uneasiness. At one time a few were extirpated, and subsequently Mr. Bryant removed sixty at one sitting! They were then not cartilaginous and could easily be enucleated. Within twelve months from the operation they were all reproduced. This most singular disease invaded finally the viscera, and a large tumor appeared to have formed in the abdomen, which was followed by ascites, anasarca of the lower extremities, and death. On examining the body the peritoneum was found opaque, but with a shining surface. "The parietal portion (says the account) and the lining of the diaphragm were studded with myriads of tumors of various sizes." The fat of the great omentum was almost entirely absorbed, and its tissue sprinkled over with numberless granules. A large mass weighing almost two pounds was suspended from the anterior edge of the liver; it extended beneath the right lobe, displacing and depressing the gall bladder. It was of ovoid and irregular form, and of very firm texture. On dividing it the tints of the cut surface were extremely varied, green and greenish yellow predominating, while the centre was nearly white and almost cartilaginous, and exhibited radiating fibres and lobules of an indistinct cystiform aspect. Blood oozed on pressure from a good many red points, but the tumor could not be called highly vascular. The disease appears to have been hereditary, but was confined to the females of the family, who were also remarkably prolific. A pullulating diathesis and tendency to fibro-cartilaginous growths appears to have pervaded the entire organism.

Mr. GoodSir (Cormack's *Lond. and Edinb. Monthly Journal, &c.* Feb. 1843, p. 171,) has removed from the compact bone of the shaft of the humerus on its outer side, an enchondromatous tumor of the size of a billiard ball, which was lobulated and of compact cartilaginous texture externally, and had internally masses of exceedingly hard bone, imbedded in soft cartilage. It bore the appearance of similar enchondromatous masses found in the phalanges of the fingers. T.]

[**GANGLIONIC, SEROUS, AND SYNOVIAL TUMORS AND CYSTS—BURSAE MUCOSÆ ET SEROSÆ—IODINE INJECTIONS.**

*Encysted Hydroptic Tumors between the duplicatures of the Peritoneum cured by Iodine Injections.*—Not only has the successful treatment by iodine injections, as established by M. Velpeau, been generally adopted in Europe for synovial tumors or hydrocele, but also, so long as six years since, was boldly applied by M. G. Pagani, Surgeon-in-Chief of the Hospital of Novarre in Italy, (see *Annali Universali di Medicina*, Fasci 296, Agosto, 1841,

also *Journ. des Connaiss., &c.*, de Paris, Fevrier, 1842, p. 84,) to *hydropic encysted collections*, which apparently existed between the *duplicatures of the peritoneum in the hypogastric region*. The case in question was that of a man from the country, aged about thirty-two, in whom a rheumatic fever of short duration and accompanied by much dysuria, and finally a sort of dysentery, was soon succeeded, in spite of copious bleedings, purgatives, &c., by the rapid formation of a large encysted tumor in the hypogastric region. An exploration by the cataract needle and trochar enabled the surgeon to draw off a small quantity of fluid very similar to that of ganglionic capsules, [i. e. *bursæ mucosæ*, or more properly *bursæ serosæ*, see remarks of M. Pétrequin under this head, infra, T.] which with an examination per anum, and the introduction of the catheter into the bladder, and evacuation of its urine, led to the diagnosis that the tumor was circumscribed by the enormously distended layers of peritoneum where it is reflected on the posterior part of the bladder and anterior portion of the rectum. The surgeon accordingly, keeping in view the analogy of tissues to the tunica vaginalis, and the cures he had obtained by injection of the alcoholic tincture of iodine in hydrocele, introduced into the abdominal cavity in question, by means of the canula and syringe, through the puncture he had previously made, two fingers' breadth above the pubis, and two inches to the left of the linea alba, a diluted preparation of the same material. A very moderate degree of warmth and reaction was felt by the patient, and in five days the tumor had entirely disappeared, followed shortly after by the cure of the dysenteric affection and perfect restoration of health. It would be worth while to ascertain how far this treatment could be employed with utility in ordinary ascites, ovarian dropsy, &c. We have already spoken of it (see Vol. I. and the present vol.) as successfully employed in the mouth of the sac in reducible hernia, after the taxis.

M. Pétrequin of Lyons, in an article on synovial tumors, (*Journ. des Connaiss., &c.*, de Paris, Juillet, 1842, p. 10, et sequ.) in passing a compliment on the labors of MM. Monroe, Brodie, Ollivier, Lenoir and Velpeau, disapproves the phrase *bursæ mucosæ* as altogether capricious and erroneous. These tumors occupy serous, not mucous capsules, and he has marked their whole progress, from their inception as simple hydropical collections, through the several successive stages of sub-acute inflammation, hematocoele, abscess, ulceration, chronic induration, &c. M. Pétrequin reverts to a treatise he had published many years since, that on *exsections of the lower extremity*, and again enforces the necessity of early exsection of the great trochanter, and saving of the leg before the exfoliation caused in that process, by inflammation and improper treatment or opening of the sub-cutaneous *bursa* situated over that prominence, shall have involved the coxo-femoral articulation; for lesions of which last there is reason to believe these implications of the trochanter from the disease in the superposed bursa, are too often mistaken. The more important does this advice become, because the affection of the trochanter produced in the manner mentioned, may extend to the joint itself.

In ante-patellar *bursæ*, (*hygroma prérotulien*,) M. Pétrequin has seen one of four inches diameter in the direction of the axis of the

limb, and three inches laterally, which had existed two years, and which Dupuytren himself had in vain endeavored to cure. These bursal tumors often result from traumatic contusions, and then contain bloody, grumous, and sometimes *fibrinous* matter, which latter M. Pétrequin considers the original cause (or nuclei) of foreign bodies about the joint, i. e. spontaneous or amphi-articular bodies.

These tumors, arrived at this condition, communicate, on pressing them, a sensation of movement, (frémissement,) leading to the idea of the existence of semi-cartilaginous corpuscles or of hydatids rubbing against each other, all which can be explained by the existence of fibrinous concretions, or the crushing together of sanguineous clots. (See M. Velpeau's remarks on these bloody tumors sup. and in Vol. I.) He places, erroneously, as we think, some reliance on resolvents, (such as muriate of ammonia,) and on compression, &c. ; but where these fail, he has found, like M. Velpeau, a cure effected by iodine injections, and should the contents of the sac be solid, an incision becomes necessary.

M. Pétrequin errs also, as we know from experience, both in olecranian and ante-patellar bursæ, (see in this note below, and also sup. and Vol. I.) in supposing that *bursting* them by strong percussion will not succeed if they have existed over a year. It is the remedy, as we conceive, *par excellence*, and next to that comes iodine injections.

He remarks, with great appearance of sound practical reflection, that such *ante-patellar* hygromas, when they suppurate and infiltrate into the neighboring tissues, might well give rise, by the tumefaction they produce, to the supposition of an inflammation and effusion into the tibio-femoral articulation.

These *sub-cutaneous, cellulous, serous bursæ*, as M. Pétrequin properly considers synovial bursæ, so called, are found, or may in fact be *accidentally* produced over all osseous prominences where there is much traction and friction of the superincumbent tissues, particularly therefore, it might be added, near the articulations. He has seen them at the inner *malleolus* also, becoming ulcerated and forming there pseudo-mucous fistulæ, like those which may result from abscesses. Such are cases in point for the iodine injections.

Besides *tibial bursæ*, as those on the internal malleolus may be called, M. Pétrequin has seen also *fibular bursæ*, i. e. on the outer malleolus. In cases like one he saw, and which resulted in caries to the fibular extremity, he properly recommends exsection of this part, which can readily be done without implicating the joint. These fibular bursæ are not uncommon among *tailors*, from their habitual position while at work making pressure on the outer ankles.

M. Sédillot speaks of *calcanean bursæ* (i. e. at the heel,) as new, or at least as hitherto undescribed by authors. That they have long been familiarly known, is an undoubted fact, but in most cases probably confounded with corns, to which they bear a resemblance at first. M. Pétrequin has described them in his usual clear and condensed manner. The epiderm forms a blister or phlyctena, and the subdermoid tissue is thickened like a large flat callosity or corn, and separated from the parts below. From this space oozes a serous watery discharge, the parts becoming more and more inflamed and exceedingly sore and troublesome. He says ulcerations and impli-

cations of the os calcis might ensue if such cases were neglected. Tight boots are the common cause, and the bursa is probably then an accidental production.

A very similar affection, which is not uncommon, (and which I have several times seen under the great toe,) explains, M. Pétrequin remarks, the existence of a *sub-metatarso-phalangeal* bursa in this part. This I treat by poulticing at first, and after the reduction of the inflammation, careful excision horizontally of the horny plates down to the sound parts, when a strap or two of adhesive plaster firmly bound round the toe and foot inclusive, readily completes the cure.

M. Pétrequin has seen a bursa similarly situated under the little toe, and considers also that a *bursa* exists *under* the heel, also on the lateral portion of the metatarso-phalangeal articulation of the great toe, where he has seen them cause much pain and inflammation, ending in suppuration, and passing thence into *chronic induration* of the capsular walls, giving the appearance of an enlargement of the extremity of the metatarsal bone. These also, we think, are sometimes mistaken for corny callosities; though most probably a great number of corns or callosities so called, about the small joints of the toes particularly, are in reality enlarged bursæ, from pressure of tight shoes, and therefore more common in females. The lateral bursæ at the toe go by the name of *ognons* in France, (see Vol. I. and Vol. II., under *Corns, &c.*) *Soft Corns*, so called in this country, and which form between the toes near their commissure, and which from their position become less frequently indurated, are also probably natural or accidental bursæ, inflamed by tight shoes.

M. Pétrequin has seen an inflamed encysted lateral metatarso-phalangeal bursa on the great toe in a man, acquire the size of an egg. It was red and fluctuating, and seemed to involve the natural bursa which exists above, and the one also below the articulation. On opening it pus and blood were discharged, after which a cure was effected by iodine injections. In one case the matter evacuated was gelatinous.

We do not wonder that M. Malgaigne, (see 4th edition of his *Manuel de Méd. Operat.*, Paris, 1843, p. 113,) could not succeed by Sabatier's inefficient mode of rupturing these bursæ, by slow pressure of one thumb over another. Sudden and strong percussion, as with a bound book, noticed by M. Malgaigne, is the only sure mode of making this process successful. (See our remarks *infra*; also on the same subject in Vol. I. of this work.) Certainly this mode could not succeed where there is no point d'appui, as when these tumors, according to M. Malgaigne, are found, (though extremely rare,) between the os hyoides and thyroid cartilage. Where they are met with, however, on the dorsal surface of the hand over the interosseous space, between the metacarpal bones, as we have said above, it would not even then be difficult, as it appears to us, to crowd them on to the adjacent metacarpal bones, and burst them in this position.

M. Malgaigne's own process in fact is nothing more than the subcutaneous principle of M. Guérin, and M. Goyrand of Aix, &c.; i. e., he draws the bursa forcibly to one direction, makes a small subcutaneous puncture into one extremity of the sac, evacuates the sy-

novia or small cartilaginous bodies if they exist, and then with the blade of the instrument sub-cutaneously breaks down effectually the walls of the bursa, after which he makes for 10 or 15 days strong pressure with flat pieces of agaric and thick compressions, (*loc. cit.*, p. 113, 114.) This process may undoubtedly answer where percussion fails.

In encysted *tumors*, developed in the cellular tissue, containing collections of serosity or other liquids of greater consistency, as pus, &c., M. Rêcamier is in the practice (*op. cit. Malgaigne's Manuel de Méd Operat.*, 4th edition, Paris, 1843, p. 113) of evacuating a portion of the pus, &c., little by little, and replacing this portion by injection of warm water, until the walls collapse and adhere, in the same way as he does for abscesses by congestion.

M. P. J. Cabaret of Saint Malo, (France,) in a memoir on *bursæ mucosæ*, (*Journal des Connaissances Medico-Chirurg.*, Paris Juin, 1844, p. 224—228,) after noticing the almost total neglect which had been evinced towards them until the time of Béclard, (*Additions à l'Anatomie de Bichat*, 1821,) states that these *bursæ* form a roundish (obronde) cavity, divided by imperfect septa, (coloisons incomplètes,) but without any opening; that in their texture they appear to be membranes, differing only from cellular tissue by being more condensed and composed of large *laminæ* (en grandes lames); their evident design being [like cushions or pulleys, T.] to give greater ease to the movements of the bones under the skin. For which purpose their homogeneous smooth surface is slightly bedewed with an unctuous mucilaginous liquid. Most anatomists concur in the opinion that they are less numerous in children than in adults, because their development depends on muscular movements. M. Velpeau has noticed them on both sides of the spine, on the malleoli, and on the outer, posterior, and middle part of the thigh. I have seen them also in one case (the result of syphilis) directly over or upon both the great trochanters, easily movable, elastic, somewhat painful, elliptical in shape, and thus buried deep under the muscles and aponeuroses, as hard to the touch as a stone, and of the size of a pullet's egg, but totally disappearing spontaneously under the proper internal remedies for the constitutional disease to which they appeared to owe their origin. They are most usually found accidentally developed in consequence of unreduced fractures and luxations, and Sir B. Brodie has seen one of great size in the case of a girl with *Talipes Equinus*, and which formed upon the part of the instep upon which she walked. (*Pathological and Surgical Observations on Diseases of the Joints*, London, 1818.) The excessive secretion from their internal surface may distend them into elastic tumors, truly *hydropical* in their character, as our author, M. Velpeau, in a recent valuable memoir, has very properly considered them. (*Recherches Anatomiques, Physiologiques et Pathologiques sur les cavités closes, naturelles ou accidentielles de l'économie animale*, 1843.) Others have on that account invented for them the name of *Hygroma*, which is adopted by the writer, M. Cabaret, whose treatise we have under consideration. M. Cabaret remarks that these serous bursal tumors are found in all parts of the body, but more especially at the elbow, [see notes on this subject in Vol. I. and inf.,] the

knee, [vide same notes, T.] in front of the patella of individuals who rest frequently upon this part, such as preachers, religious persons, washerwomen, slaters, tilers, thatchers, &c., &c. In England, from the more rigid division of society there for centuries into certain casts or permanent occupations from one generation to another, more opportunities of course present for noting what may be considered the accidental products or results of such professions or occupations. Hence we hear there, and see surgical descriptions of these enlarged bursæ under the familiar names of the *miner's elbow*, the *housemaid's knee*, and the *scrivener's palm*, &c. Sir B. Brodie has known this disease to be hereditary.

These tumors are, as might naturally be conceived, more or less dense or elastic, more or less distended, and of greater or less volume, according to the greater or less pressure, constriction, motion, &c., of the surrounding parts. While not in a state of inflammation, the contained fluid continues to be analogous to synovia; when arising from contusions, blood may be effused, giving a reddish or brownish or black color to the synovia. They then may be said to constitute a natural *hæmatocele*, the same as happens in the cavity of the tunica vaginalis testis, or as some now call it *peri-testis*, in which case they present the most favorable circumstances for M. Velpeau's treatment of bloody tumors by percussion, [see Vol. I. supra,] or puncture and iodine injections, more lately advocated by our author. [See sup.] Fibrinous clots, says M. Cabaret, or a sort of transparent *bouillie*, are sometimes the result of the alterations which the blood undergoes in these tumors. At other times the liquid they contain is mingled with a number of movable bodies of a flattened oval form and deep-brown color, and in appearance resembling melon seeds. These small masses, which are at first albuminous and movable, progressively acquire a great degree of hardness.

M. Cabaret rejects every kind of local application, of frictions, lotions, unguents, &c., whether iodine, mercurial, saturnine, or otherwise, and also doubts the value of compression and temporary blisters, which have succeeded with M. Velpeau.

Excision of the tumor in whole or in part is also generally proscribed. M. Velpeau has seen two cases of death from this operation, (see *Archives Gén. de Méd.*, Paris,) and Mr. Keate has seen the disease return in a case in which he believed he had thus extirpated it. Sir B. Brodie recommends it only under certain restrictions or qualifications, which according to M. Cabaret are where the bursa has become fibrous, thick, disorganized and incapable of resuming its normal condition.

Simple incision is of no avail, as we all know, against a return, and the consequences, such as intense inflammation of the surrounding tendons, sheaths, and muscular tissues, abscesses, phlebitis, &c. are often of the most formidable character, which are likely, as we consider, to be aggravated by the former practice of introducing a seton into the cavity thus opened. This mode of provoking agglutination of its walls we deem too severe, of which opinion we find also M. Cruveilhier.

Puncture of the hygroma and injection of a moderately stimulating liquid, as for example, the iodine injections which have proved so

successful in the hands of M. Velpeau, is, according to M. Cabaret, deserving of adoption as a general method of cure for this disease.

M. Cabaret, in illustration of the success of this treatment, presents five cases, four of which were bursal tumors on the patella and one on the olecranon, and all of which were perfectly cured by puncture and injections of wine and water, diluted tincture of iodine, &c., causing in a few days complete agglutination of the walls without any serious degree of inflammation. We should suppose that for the puncture an extremely delicate trochar, not much larger than an exploring needle, would be most advisable, rather than an ordinary trochar or bistoury.

In conclusion, M. Cabaret says: The three last cases (two of the patella and one of the olecranon, and in which he injected the iodine) which I have just given, and many others which I possess, furnish incontestable evidence of the truth of the law laid down by M. Velpeau, in the following terms: that "we should cause to be produced in shut cavities containing effused fluid, an irritation which should be constantly *adhesive* and never *purulent*." These cases, adds M. Cabaret, will, I trust, help to make us feel the value to be derived from the treatment of hydropsy of the sub-cutaneous synovial bursæ by *iodine injections*, as administered according to the method of the learned professor of clinical surgery at the Hospital of La Charité.

Nevertheless, as we have before expressed ourselves upon this subject in various places in the text of this work, we must with all due deference to the importance of the facts above adduced, and of the unquestionable value of the treatment proposed and so successfully pursued by M. Velpeau, confess that we should in all cases where it is practicable, and where there is but little or no serious pain or inconvenience in the tumor, be the tumor of what size it may, (provided it has not, from its long standing, undergone the kind of fibrous consolidation spoken of,) prefer *sudden and powerful percussion*, as we have described it.

The distended, rolling bursa is then instantly broken up into fragments, if the stroke is made from a considerable height and with great force and rapidity, as by a heavy book or something similar, held in the operator's hand, while the patient is unaware of your intention and has his head turned away, and arm or leg firmly supported upon a table. Thus have I perfectly succeeded in a large olecranial *bursa*, which had been growing for a year or more in H—, a healthy mulatto (part Indian and part white) of sound constitution and good habits, and aged about 35. The patient, who was confidential porter of a distinguished mercantile firm of this city, finding the tumor at length had attained such dimensions, being oval shaped and of the size of a small hen's egg and exceedingly tense, though elastic, as to give a considerable degree of pain and annoyance in the use of his arms in hoisting and carrying boxes and bales of goods. He had imagined his arm would have to be *amputated*, and having promised, if it should be found necessary when I should examine it, (for I had not yet seen it,) that if so serious an operation as amputation was required it should be performed, I sent word to him to call upon me, and in that event I would give him a note to an eminent surgeon, who would do it at his clinique at

the University. Immediately on looking at it I perceived it was nothing more than a bursal tumor, and as there was nothing to prevent proceeding at once to the mode of cure I have mentioned, I asked him to stretch his arm out in pronation firmly upon the table, and to turn his head away. Having at this time purposely in my hand a heavy quarto volume which I appeared to be engaged in perusing, I suddenly came down upon the enlargement with it, holding it in both my hands, with all my force, from an elevation of three feet, striking such a blow upon it as dispersed in an instant every vestige of disease. To the patient it naturally seemed *marvellous*; and in fact would have appeared to be such in the eyes of most persons out of the profession. If an operation of this kind, so instantaneous, so bloodless and painless too, it may be said, (for the pain is but momentary,) and yet so radical in its total extirpation of the disease, was known to the school of Esculapius, we cannot wonder why the ignorant, marvel-loving, superstitious multitude, before whom this master spirit could have turned such skill to a valuable account, (by momentarily taking the patient for a few instants out of their presence,) should have deemed him more than mortal, and built altars and temples to his honor.

Far be it from the writer of this, however, to glorify himself on such an achievement, so long as its common utility and the facility with which any person may perform it, are so obviously sustained on the plain principles of common sense.

The truth and efficacy of this treatment, and its total protection from all return of the disease or any accident whatever, had been made manifest to me many years since, during my residence at Nassau, in the Bahama Islands, in effecting the same results for bursal enlargements upon the *wrist*. Besides the remarkable case of that on the olecranon just mentioned, I have since performed the same operation on another patient, also a laboring man, and on whom the tumor was situated in precisely the same locality; but in this last patient, from not having had it in my power to strike a full and perfect blow at first, I was obliged to repeat it a few days after, when the cure was complete, and has remained so now in both the individuals (whom I am frequently in the habit of seeing) for several years.

In another case there was a hemispherical sub-cutaneous bursal tumor of great size on the patella, full equal in dimensions to the half of a large orange, and completely covering the patella like a large inverted cup. This man, as the porter or wine-marker of a wine vault in the largest hotel in this city, was in the constant necessity of being upon his knees. I effected a partial cure and subsidence of the tumor for a year or more by producing, by means of common strong ammoniacal liniment, a copious suppurating drain over its whole surface for weeks; but ultimately was obliged, about three years since, to come to *percussion*, which was performed as mentioned, and which effected, as he informed me within a few months past, a radical and permanent cure.

It is unnecessary, perhaps, to say more than we have already said in the first volume on the new mode of curing bursal tumors by breaking them down (as in couching the lens in cataract) at the point

of a narrow tenotome, introduced sub-cutaneously at some distance from the tumor. The cures effected by this process, appear to be well substantiated, (vid. Vol. I.) and we have had no evidence (at least no published evidence) of its failure in any case. *A priori*, however, it would be deemed an operation of too great severity, but for these successes, and others of a more remarkable kind, by the same process, in extracting foreign bodies from the knee joint, and the practicability of which M. Velpeau himself has recently confirmed (vid. Vol. I.) by the sub-cutaneous extraction of a ball from the same articulation.

The successful treatment of enlarged *bursæ mucosæ*, by injections of *tincture of iodine*, as some years since introduced into practice by the learned author of this work, M. Velpeau, has, we are gratified in perceiving, been recently verified in a most satisfactory manner, by experiments performed for the same disease in horses. At the sitting of the Academy of Sciences of Paris, March 24, 1845, (see *Gazette Médicale de Paris*, Mars 29, 1845, tome XIII., p. 204, 205,) MM. Thierry and Leblanc communicated the result of their experiments upon this subject, made in presence of MM. Velpeau and Rayer. It is known, say MM. Thierry and Leblanc, that horses are often affected with dropsy in the articulations and mucous passages (*les courses muqueuses*), and which are described by veterinary surgeons under the name of *wind-galls* (*molettes*) and vessigons. Up to the present time, one remedy only has been employed for this affection, namely, the red hot iron, applied either in the shape of the rayed or the pointed cauteries. But whatever were the means used, injurious traces of the disease always remained behind. It was with the view of obviating this inconvenience, that the authors, guided by the researches of M. Velpeau, made experiments with iodine and vinous injections as compared with the application of the hot iron. From the results they obtained, they believe themselves authorized in declaring that iodine injections in the mucous bursæ and synovial sheath's, in horses, may advantageously replace cauterization by the red hot iron, and that in a plurality of cases, this mode of cure ought to be first employed.

We have upon the strength of well-attested recorded facts, considered the discovery of the mode of effectually curing these ancient *opprobria*, by the new system of *sub-cutaneous puncture*, so important and valuable, that we have been thereby in some measure compelled to anticipate our author in the position to which he has assigned this subject in the French edition of this work. As the *cure* of these bursal tumors, which have hitherto so much annoyed, as well as baffled, our art, except where the patient and surgeon together, have had the courage to adopt the ancient, and after all, when the case warrants it, the most radical process, (we mean *sudden percussion*,) is the most important point to be considered in relation to them; we have, in consequence, said most of what we had to add on that subject, under the head of sub-cutaneous surgery, in our first volume. Though incisions and setons in these natural bursæ, enlarged morbidly into painful encysted sacs, (the most inconvenient cases of which are those in working men, as those familiarly known in Eng-

land, as the *maid-servant's knee*, the *miner's elbow*, and the *scrivener's palm*,) have been for the most part abandoned for the tenotome, several surgeons, nevertheless, among them our author, M. Velpeau, continue to adhere to his process. M. Velpeau's mode consists in a simple puncture with the trochar, to evacuate the *hydatid corpuscles*, which step is deemed indispensable to the cure, after which he makes use of free injections of diluted tincture of iodine, after the present received mode of treating hydrocele, in order to stimulate the sides of the sac to agglutination. M. Velpeau has met with most signal success by this course, and obtained speedy cures, free from all accidents. (*Ann. de Therap.*, Paris, April, 1845—also Cormack's *Lond. and Ed. Month. Journ.*, June, 1845, p. 460, &c.) M. Chassaignac (*Ibid.*) in a remarkable case of one of these tumors in the wrist, found that from its great size, twice that of an egg or orange, it was compelled by the annular ligament of the wrist to assume a *bilobate* form, about one half being above the ligament, and the rest in the palm of the hand. The large quantity of hydatids evacuated by the trochar were found by M. Chassaignac to be true species of that enzootic class, possessing, as examined by the microscope, elastic, compressible, *vesicular bodies*, and not composed of those hard, albuminous concretions which are mistaken, he says, for them.

M. Gherini, surgeon of the great Hospital of Milan, (*Ib.* and *Annali Universali*, Jan., 1845,) saw also a *bilobate* bursal hydatid cyst on the posterior part of the *elbow*, though that has no annular ligament to explain this form, and cured it by incision, evacuating 52 barley-shaped corpuscles. The sac suppurred, but the cure was complete. Neither of the lobes of the bilobular cyst communicated with the articulation. We should for ourselves be adverse to the incision in any case except in one of extreme necessity, as, for example, where there was great extent of inflammation in the cyst and neighborhood, from bruises, injuries, &c., and then the knife should be withheld until general and topical depletion had reduced the violence of the inflammation and attending fever, if any, and that the distension of the sac by the contained synovial or hydatid matters had made it necessary. But a mere small sub-cutaneous incision in such cases, and sufficient to evacuate the contents, is a very different thing from an extensive dilatation of these cavities themselves, while they are in an uninflamed state. The incision practised in this latter state, from the exposure to the air of the peculiarly sensitive tissue of these bursæ, becomes itself, by the operation, the source of danger, whereas in the other case, it is to subdue inflammation, that we have recourse to it. We think we are warranted by the pathological discoveries of sub-cutaneous surgery, and by the reiterated injunctions so studiously enforced by our author throughout this work on the subject of the dangerous accidents, such as burrowing, destructive suppuration, phlebitis, purulent infections, tetanus, typhus, &c., from wounding synovial membranes, surfaces, passages (*coulisses*) and capsules, to lay it down as a precept, that these bursal cysts must not be thus meddled with by direct incisions, except under the circumstances mentioned.

Irrelevant and improper as would be the admission into a work eminently didactic and elemental as is this on operative surgery by M. Velpeau, of all matter purely controversial, unless as in the academic discussions upon tenotomy (see Vol. I.) and those on fibrous tumors, (see this vol. infra,) new and valuable facts are thereby elicited, we deem it, nevertheless, an act of impartiality to state in this place, in reference to a subject already treated of in the 1st vol., (the sub-cutaneous puncture for articular dropsies and foreign bodies, &c.,) that M. Bonnet, of Lyons, claims the merit, how just we cannot at present decide, (see his recent work, *Traité des Maladies des Articulations*, 2 vols. in-8° Paris, 1845, also a notice of the same in the *Gazette Médicale de Paris*, Mai 17, 1845, t. XIII., p. 319,) of having been the first to employ, and before M. Velpeau, *iodine injections* into the articulations. By a curious coincidence, however, M. Bonnet himself, in making this reclamation over the surgeon of La Charité, has in his work just cited, committed an act, (*Introd.*, p. xxxvi, and tome I., pp. 451, 487,) according to M. H. Diday, (*Gaz. Méd.* loc. cit., p. 320,) of positive injustice towards M. Jules Guérin in another matter appertaining to this subject; viz., in asserting that we owe to M. Goyrand, of Aix, the credit of having first treated the evacuation of articular dropsies, and the extraction of foreign bodies in the joints, by the sub-cutaneous puncture. M. Diday contends (*Gaz. Méd.*, loc. cit., p. 320,) that at least the germ, or original idea of this treatment, in both these classes of affections, was so specifically and formally laid down by M. Guérin, as early as in the years 1840 and 1841, (see M. Guerin's *Mém. sur les Plaies Sous-cut. des Artic.*, lu à l'Acad. des Sciences de Paris, le 4 Mai, 1840; and the *Essais sur la Méthode Sous-cut.*, Paris, 1841, pp. 84 et 113,) that there can remain not a shadow of doubt as to his (M. Guérin's) claim of priority. M. Diday, however, seems willing to make a sort of commutation of this last mentioned difficulty, by admitting that M. Bonnet may possibly be entitled to the merit of having been the first to *execute*, and *with success*, the *sub-cutaneous* operation for the extraction of intra-articular foreign bodies; but that the same operation as applied to the evacuation of the liquid of hydarthrosies, by making this fluid pass under the skin, by a sub-cutaneous incision into the synovial capsule, as practised by M. Bonnet, is not so 'certain and efficacious a cure as the pure and simple evacuation of the liquid, by means of the syringe, as practised by M. Guérin; the process of M. Bonnet incurring the risk of not procuring a complete evacuation, and of leaving a portion of the liquid, as an irritating substance, under the skin.

*Patellar bursæ*, or those between the patella and integuments, and familiarly known in England as the *housemaid's knee*, may, Sir B. Brodie is satisfied, be reproduced after their complete extirpation, as he has frequently found to be the fact. (*London Med. Gazette*, May, 1846, p. 829, from Sir. B. Brodie's Lectures on Pathology and Surgery).

*Sanguineous Tumors treated by Ecrasement*.—The process of crushing, which we have felt it our duty to advocate in such unequivocal terms, as the one which should always be preferred, where practicable, for mucous bursæ, has been applied with eminent success,

also, in sanguineous hematic tumors that are external, and favorably situated for percussion. M. Velpeau reasoned very naturally, (*Traitemenit des Tumeurs Sanguines par écrasement; Annales de la Chirurgie, Aout, 1843; Arch. Gén. 4e, ser., t. III., pp. 217, 218, 219,*) that the extravasated blood of such tumors, if once dispersed by their rupture, so as to become infiltrated into the surrounding cellular tissues, must naturally from its assimilation to the great mass of the vital fluid, be absorbed with yet greater facility than the serous liquid of synovial bursæ. He also presents as another striking argument for the *écrasement* of such tumors, the fact, that left to themselves, in their semi-concrete and confined position, they are rarely absorbed, whereas every one is familiar with the fact that every ordinary ecchymosis or extravasation of blood from a blow or bruise, is rapidly absorbed, and for the reason, that in the latter case it is dispersed by the accident itself, into the cellular tissues. This, probably, is the source of the correct vulgar practice of applying pressure and friction immediately, and as soon as such bruises are received. The *écrasement* is performed by M. Velpeau by sudden pressure upon the tumor, with the palm of the hand or with the thenar eminence, or with both hands, or it may be done with a solid body, as a piece of money or wood, which is to be struck upon with a hammer or the fist. The tumor is broken up immediately, leaving only some lumps (bosselures) in the tissues. The tumors best adapted to it should not exceed the fist in size. He very judiciously adds, that a solid point d'appui must of course exist as in ordinary serous bursæ, and before the operation can be thought of. In case of an eschar on the tumor, the process may still be applied if the eschar is superficial, and has not begun to be detached; in the contrary case we should abstain. Ecrasement is better adapted to the effusions in accidental, than in normal close cavities, as the walls of these last are always thicker, and consequently more resistant. M. Velpeau furnishes numerous cases of cures in favor of this, as it appears to us, most judicious treatment. Surgery, it may be said, has at length obtained a tolerable mastery over external, synovial and hematic tumors, either by means of *écrasement* or sub-cutaneous injection of iodine, to say nothing of the value of this last, or favorite process of the author in normal close cavities.

*On Close Cavities in general.*—Before this chapter closes it is proper to insert in this place, and more in detail, the new and important views of our author, M. Velpeau, as published by him in his work, entitled *Recherches Anatomiques, Physiologiques et Pathologiques sur les Cavités Closes, naturelles et accidentielles, de l'économie animale.* (Par A. Velpeau, &c., Paris, 1843, pp. 208, see also an extended abrégé of this in the *British and Foreign Med. Review*, vol. XVIII., July—Oct., 1844, pp. 79, 90.) M. Velpeau maintains the new proposition, that serous and synovial membranes, as distinct tissues, *have no existence*, and consequently that the notion of close cavities formed by such membranes, is entirely devoid of foundation. He bases this proposition on the facts obtained from intra-uterine life. From ten embryos examined by him, and which were from fifteen to thirty days old, he concludes that even up to the 4th week the free surfaces present no appearances of membrane; the whole body consisting

apparently, of a homogeneous, gelatiniform and fragile substance, none of the cavities any where being lined with any distinct membranous tissue, or laminæ capable of being isolated. The whole is either *surfaces* or *parenchymata*, while there is nothing either in the head, chest or abdomen, to justify the expressions cutaneous, mucous and serous membranes, &c. He contends that what for example we call in extra-uterine life the peritoneal or serous membranes do not always exist, and cannot be detached as a distinct peritoneal or serous membrane, properly so called. They are in fact only *serous surfaces* continuous with, and not separable (except by a traumatic division) from the subjacent cellular parenchyma of the organ, as on the liver, uterus, ovaries, &c. So behind the linea alba. In proof of this, it is to be considered that the *serous membranes*, properly so called, do not exist, and do not become manifest until at a very advanced period of the embryonic state, that is, prior to the organs invested by them. Pursuing the same course of reasoning in respect to other cavities than those of the abdomen, and which, however ably maintained, is too strictly pathological to be properly embraced in the text of our work, M. Velpeau comes to synovial cavities, properly so called. He shows that there are but few vestiges to be found of this supposed serous membrane. Thus, in the knee it is no where to be found, on the free surface of the cartilages, or on the internal surface of most of the ligaments.

*Accidental close cavities* are divided by our author into functional and pathological. The functional consist of: 1. Serous cavities 2. Articulations; and 3. Cellular cavities. The first, or *serous*, are formed by an ovary, a noose of intestine, or a knot of epiploon or other viscus passing through a fissure of the peritoneum and abdominal muscles, so as to fix itself under the skin. The second or *articular*, are connected with the articulations, and caused by a luxation or fracture. They have no lining membrane, and are nothing more than the polished surface of the textures which enter into their composition. The third or *cellular* cavities, are those usually denominated synovial or mucous bursæ, and are accidental sub-cutaneous arrangements, which nature interposes over any projecting point or surface of bone which is exposed to much pressure from without, and are evidently designed to protect the soft parts from the hard, in the nature of pulleys, or rather a sort of distended sacs or air cushions. Thus on the backs of porters and on the acromion of persons who carry burdens on the shoulders, on the angle of the scapula in those who carry scuttles, &c., on the anterior part of the sternum in joiners, &c., on the malleoli, [and tuberosities of the ischium, T.] in tailors, &c., on the hump of humpbacks, and on the salient points of club feet. To these we may specify those which in certain occupations in England are so common as to have acquired, as we have elsewhere frequently noted in this work, a particular designation. Thus the bursa over the patella, called the *housemaid's knee*, seen also in the other sex, and in all who have occasion to rest much on this part; so also the *miner's elbow*, meaning the bursa at the acromion, caused by the position in which the miner works. To these add the *scrivener's palm*, or bursa in the palm and wrist of those who have to write a great deal. Our author also has seen them on the body of

the clavicle, on the posterior surface of the fore-arm, on the internal surface of the tibia, the crest of the ilium, &c., from exposure of those parts to friction and pressure. All these cavities, like normal ones of the same character, are destitute of investing membrane.

*Pathological close cavities* comprehend every kind of abscess, cyst, and morbid deposit. But it is to *morbid sub-cutaneous close cavities*, analogous to the normal close cavities of joints and under tendons, that he particularly directs attention. These *sub-cutaneous morbid cavities* are observed: *a.* In the *cellular tissue*, which have been described particularly as serous cysts, and which are surrounded by the condensed cellular tissue, which is mistaken for a supposed lining membrane to the cavity; *b.* In *glandular bodies*, as in the thyroid body, breast, testicle, &c., where it is also clear that their surface is part of the tissue of the gland. The *pellicle*, which may occasionally be separated, has been formed there in the same way as that which constitutes a part of the cavity of an aneurismal sac, in which the blood has continued to circulate. In the ovaries, M. Velpeau says, the truth of his doctrine is strikingly illustrated by the coexistence of *real cysts* like hydatids and which can be readily detached from the tissue of the organ, with close cavities the surface of which is inseparable from it, and forms part of it. *c.* In *ganglial cavities*, as under the jaw in the region of the parotid, and in the carotid canals, and in front of the larynx, in the supra-sternal fossa, axilla, bend of the arm, groin, and ham, and in the interior of the pelvis. These last may exist in the gland, shut up, as it were, and with their sides in contact, or if they are towards the surface of the gland, they then, from having room, expand into a pouch, which, however, will always be found to be attached in some portion of it to the glandular mass. The practical inference from all the above is that *diseases of close cavities or surfaces* are in fact primarily nothing more than *diseases of the tissue*, of which these cavities constitute a part. From whence M. Velpeau lays it down as a law, that as the articular cartilages are destitute of arterial and venous circulation, and of a serous membrane, properly so called which is distinct from their tissues, so neither inflammation, ulcers, fungous diseases, nor transformations, nor degenerations of any kind, exist as a primary malady on the free surface of those articular cartilages. A deception may arise in this way; that inflammation without the cartilages may lead to a deposition of lymph between the cartilages, and this deposition becoming organized and vascular, or even blended with the surface of one of the cartilages, may give rise to the supposition that the free surface of the cartilage itself is the seat of the disease. For this deposition may constitute a real vascular movable membrane in the articular cavity. Hence fungosities and vegetations upon this membrane may be described as those of a synovial membrane. M. Velpeau admits that in the progress of the disease, the cartilage itself may now become implicated, and thus vascularized from its circumference to its central parts. This however, he says, is no proof of a real synovial membrane, as the friends of Bichat maintain, on the diarthrodial cartilages, or that inflammation ever originated on an isolated layer of such cartilages.

The opinion advanced, that articular cartilages are *unorganized*,

is, it must be confessed, contested by a great number of authors. M. Velpeau contends that the *synovial fluid* is directly produced from the surface of the articular cartilage. The salutary organic process of adhesive inflammation, deemed peculiar almost to cellular tissue, and seen as the precursor or protecting interposition intended by nature to circumscribe and to intercept the progress of suppuration, is developed also in close cavities, and with the greater rapidity in proportion as their parietes are smooth and completely serous, finally soldering them together and obliterating the cavity. This adhesive inflammation is dangerous in large cavities, as in the peritoneum and pleura, and may in its turn give rise to suppuration. The *excitation* therefore, where we wish to obliterate a cavity, as in hydrarthrosis, should, as before observed, be so controlled as to produce always an *adhesive* inflammation *only*, and one which shall never become purulent. The more the effused fluid resembles serum, the more easy is it to procure adhesive inflammation, and the more it resembles pus, the less chance is there of escaping purulent inflammation. Hence it is an important point to change the contained fluid as much as possible into the condition of serum, which our author maintains, can in certain cases be effected by frequently emptying the cavity by puncture. So also with accumulations of blood; and in this manner there is finally poured out instead of blood or pus, a purely serous, or a sero-sanguineous or sero-purulent fluid. This result M. Velpeau has verified in most regions of the body. This brings our author naturally to his favorite injections with iodine, as tested by him with such eminent success in hydrocele, &c., and the latest information in regard to which will be found at length in our notes under that head (*infra*). He remarks in this work under consideration, that additional importance is given to iodine from its well-known resolvent properties, and the beneficial influence which these properties may have upon the *infarcted condition* which is generally found to exist in some parenchymatous organ, in those cases in which there is a serous effusion in a close cavity. This applies directly to an infarcted or congested testicle accompanying hydrocele, and where M. Velpeau has found the true treatment to lie in a course which is the reverse of the old practice. Thus, therefore, instead of endeavoring to resolve the congested testicle before treating the hydrocele, he begins with both, and acts upon both at once by his iodine injections into the hydrocele cavity; that is, provided the infarction is not scirrhous, encephaloid, melanotic, or tubercular, but merely a hypertrophied condition of the testicle. The most fortunate results have been obtained by M. Velpeau by the practice in question.

But it is unnecessary to dilate here on the advantages of these injections, as we have given the latest details from M. Velpeau himself and others, (see this volume, *supra*) and (*infra*), as more fully disclosed in the recent animated discussion to which this subject gave rise in the Paris Academy of Medicine. It is proper, however, to notice the various kinds of diseases of close cavities in which M. Velpeau now successfully employs this treatment:—1. In encysted collections of serum in the tunica vaginalis. 2. Collections of serum in the tunica vaginalis, which communicate with the cavity of the

abdomen, forming what is called congenital hydrocele. 3. Serous collections within a perineal sac, whether the sac be continuous with the peritoneal cavity or otherwise. 4. Encysted serous collections of the spermatic cord. 5. Serous collections in the external genital organs of women, contained in close cavities, and resembling the last mentioned. 6. Serous collections in the lymphatic ganglia of the groin and iliac fossa; and 7. Collections of purely liquid blood in the interior of the pelvis in women. We wish we could subjoin additional successful results to the few well-authenticated cases we have alluded to in our first volume, in which the neck of the sac of several old, large, and reducible inguinal hernias, (not congenital,) has been completely and permanently obliterated, and the hernia radically cured by means of *injections of Tincture of Cloves*, (doubtless suggested by the practice of M. Vélpeau,) in the hand of some young and bold practitioner of this country. But we are not aware that this practice has been followed up, though several remarkable cures to which both Dr. Mott and myself were both eye-witnesses, and the happy results of which gave much satisfaction to that surgeon, would certainly authorize new trials with it. M. Vélpeau has succeeded with iodine injections in the cavity of a large sanguineous tumor, which was diagnosed and proved to be such by this distinguished surgeon, and which had formed behind the uterus and ascended towards the right iliac fossa. He also succeeded in a case of an accidental close cavity in the thyroid body, which though the first in which he found constitutional febrile reaction caused by the iodine, ultimately recovered. Finally, the same success has attended his iodine injections when thrown into the cavities of the joints, to cure articular effusions, and he had thus already triumphed (when this book was published, 1843) in six cases out of seven of pure hydrarthrosis. His experiments on dogs go to show that iodine of more strength than one-seventh of the water used to dilute it, is fatal when thrown into the peritoneal cavity; not however by absorption and poisoning, but by peritonitis and enteritis. The state of this question of iodine injections at the present time will be best understood by our notes elsewhere in this volume, (vid. infra.)

*Treatment of Tumors.*—M. Bonnet of Lyons, with all the natural predilections which an eminent surgeon like him must possess for the chirurgical rather than therapeutical treatment of disease, has in his late important work (*Traité des Maladies des Artic.*, 2 vols. in 8°, Paris, 1845: see a short critique on this work, by M. H. Diday, in the *Gazette Médicale* of Paris, Mai 17, 1845, p. 316 et sequ.) insisted very judiciously as we think upon the absolute necessity of looking to the general diathesis of the whole system as the frequent if not most common source of all fungoid, serous and other growths and diseases in the articulations. Some of his views upon this subject appear to be presented under an original aspect. The cause of these diseases lies, M. Bonnet says, most frequently in an *arrest of organic development*, dependent on the general condition of the system. Thus *articular fungosities* (fungous growths or tumors) for example, are nothing else than plastic lymph which has been suspended by an internal influence; the part which is the seat of the disease being but a type of what is passing in the general economy;

but if the vital energy in the latter, now temporarily paralyzed, should recover itself, these fungosities will be converted into fibrous (i. e. healthy organic) tissue. As in the serous membranes, so in the articulations, the fibrous transformation is the fortunate or salutary maximum or last term of the *nitus formativus*: and wherever a fibrous layer is found upon the articular surface of bones denuded of their cartilage, and that we perceive this tissue expanded into membranes, or concentrated into fibrous bundles (*faisceaux*) going from one articular extremity to the other, we may conclude for a certainty that there has been one step taken towards a cure, a *vis medicatrix* established by nature to complete the evolution of the coagulable lymph.

M. Bonnet makes three distinct classes in the products of secretion which are formed in diseased articulations: 1. Those which are systematically (*régulièrement*) organized; 2. Those which are arrested in their organization; and 3. Those which are not at all organized.

Thus the general diatheses, so clearly established in *arthralgias*, may be characterized themselves by their tendency to favor one or the other of these three products: in the less severe, as in acute or chronic rheumatismal diathesis, the tendency is to the first or effusions of plastic lymph; in other cases, as in the scrofulous diathesis (where synovial fungosities are most frequently met with) a disposition will exist to the secretion of incomplete organic products; in the diathesis which is still more aggravated, [i. e. where there is the greatest degree of degeneration in the organism, T.] as in the tuberculous, purulent and gouty, there are no organic products secreted, but depositions of tubercles, pus and uric acid, [rather lithate of soda either in a fluid state or in crystals, which depositions constitute gout. T.]

*Fungous articular tumors* are unconditionally ascribed by M. Bonnet to the scrofulous or so called strumous diathesis, of which he makes several species, altogether distinct from the products of the tuberculous diathesis, as well by their external appearance as by their peculiar characters.

He makes two distinct classes of scrofulous persons: 1. Those who are pale, thin and without any trace of tumefaction in the external glands; such have also hollow cheeks, the eyelids and lips thin, complexion pallid, and frequently cold abscesses (*abcès froids*) without tubercles. These are individuals with the *purulent diathesis*. 2. The other class have the face full, the alæ of the nose, the lips and the eyelids tumefied, and the glands of the neck in general voluminous. They are disposed to congestions with mucous secretion, ophthalmias, otirrheas, &c. These are what are denominated pre-eminently scrofulous temperaments, but which M. Bonnet proposes to consider as laboring under a *fungous diathesis*, (*diathèse fungueuse*.) In them we frequently meet with local lesions, such as those fleshy soft masses, whose tendency is to suppuration and which are usually designated under the name of *fungosities*, (*fongosités*)—not only in the articulations, but frequently in the bones themselves, under the name of *spina ventosa*; also in the glands, which thence become swollen, and in the nose and cheeks, where they may ulcer-

ate and become the source of phagedenic eruptions (*dartres rongeantes*), [as *phagedena* or *cancra oris*, T.] &c.

M. Bonnet has pointed out with much force, the injury done in the treatment by the common machines employed to keep the joint in a constrained and vicious position, whereby the disease, from a false idea of obtaining repose for the limb, is greatly aggravated, the synovial membrane and ligaments on one side kept in a state of tension, the osseous surfaces compressed on the other, with a permanent tendency to an alteration in the natural relations of the bones. He had by various experiments on the dead body, to determine the best possible position for the articulations, contrived a number of kinds of ingenious apparatus based upon these objects: 1. To bring the limb into such a position that no stress is made on the synovial membrane and ligaments, that no danger is incurred of spontaneous luxation, and that will allow (as in cases of ankylosis) of the easiest exercise to the limb; 2. To retain the part in this position during a greater or less length of time, as may be required to complete the cure.

Among other remedies of a local character, M. Bonnet has derived great advantage in articular diseases from *transcurrent cauterization* with the red hot-iron, frequently repeated, eight or ten times for example, on the same scars—also from the *moxa*, for which purpose he prefers the large *Egyptian moxa*.

*Double Encysted Tumor.*—Dr. W. L. Atlee, of Lancaster (Pennsylvania), gives a very interesting account of the successful removal, by him from a healthy, robust boy aged four years, of an enormous spherical double encysted congenital tumor on the right side of the trunk, which overlaid several of the lower ribs and the abdominal muscles on that side, encroaching even upon the internal abdominal ring. It was closely adherent by a broad base to the tissues mentioned. On making a long incision over it in the direction of the fibres of the external oblique muscle, he finally succeeded by a tedious dissection, rendered the more so by the obliteration of the sub-cutaneous cellular tissue, in extracting the entire mass. This was found to consist of two distinct hemispherical cysts, one within the other, and both filled with serum, the intervening space between the two being filled up by small oval hydatid-like cysts containing pink-colored serum and which communicated with each other by narrow necks. Tough fibro-cellular aponeurotic bands ran over the inner surface of the two principal cavities and connected the whole structure firmly together, giving it the appearance of the interior of the ventricles of the heart. (*Amer. Journ. Med. Sciences*, vol. VII., new series, Philadelphia, 1844, p. 84-88.) T.]

## CHAPTER IX.

## FIBROUS TUMORS.

Among the concrete tumors which remain to be spoken of, I have a word to say of those which are known under the name of fibrous tumors; not that I propose to treat now of *polypis* under this name, (de ce nom,) but of tumors which appear to originate from a concretion of lymph or effused blood in the tissues, or from a transformation or limited hypertrophy in some circumscribed part of the natural tissues. These tumors, which are ordinarily globose, (globuleuses,) though more or less bosselated, are hard, elastic, indolent, and of a grayish color and of a fibrous and mammellated structure. Some excavate for themselves a species of cyst in the tissues, the different layers of which latter they flatten out (*étalement*) and compress; others are blended so intimately with the surrounding tissues that it is impossible to separate them from these by enucleation. I have seen some tumors of this kind which had acquired the size of the head of an adult, and it is rare they are found of much greater dimensions except in the interior of the pelvis; most usually they do not exceed the volume of a small nut, or that of an egg or the fist. As they occasion no inconvenience in themselves, they may exist during life without any real danger to the patient. As they are, moreover, wholly incurable by any other mode than by extirpation, it is imprudent to meddle with them, unless by their volume, weight or position they occasion some actual trouble or disturbance in the economy, or too great a degree of deformity.

## § I.

To effect their separation by a ligature would not be possible or at least not advisable, but for such as had a sufficiently narrow pedicle or neck at their union with the skin. In regard to this, I have only to refer to what I have said of the ligature for tegumentary tumors, properly so called.

## § II.

When we have decided upon extirpating them, we have scarcely else than to recall the rules for the extirpation of fatty, rather than those for lymphatic tumors. As they are generally disconnected with any kind of constitutional affection, and constitute almost always a disease purely local and separate from and independent of all the natural tissues, and represent, in a word, a simple foreign body in the midst of the organs; a fibrous tumor may be extirpated with every degree of security, and without the necessity of removing with it a large portion of the sound parts. Being rarely liable to return, and leaving a wound which is pliant (*souple*) at the bottom, and destitute of any dangerous germ, we are enabled after effecting their ablation, to undertake immediate reunion with every possible chance of success. What I have just said, however, is applicable only to those

fibrous tumors which have, so to speak, dug out for themselves a cyst in the midst of the cellular tissue. In fact, in respect to the others, it would be impossible to isolate, and preserve the skin which covers them. There are in fact some which, under this point of view, would lead to unexpected embarrassments if we attempted to operate upon them by the ordinary methods. A porter who had upon his nape a fibrous tumor of the size of the fist, came in 1831 to the hospital of La Pitié to have it removed. This tumor was movable, with a large base, indolent and devoid of any change of color upon the skin. With the view of laying it bare, I made a crucial incision upon it, but soon discovered that there was no limit between its tissue and that of the skin. It consequently became necessary to cut out the four flaps in their whole extent at the expense of its external surface; and when I had extirpated it, I was enabled to ascertain that it was continuous at all its points with the tegumentary tissue, of which it seemed to be nothing more than an inflated (*rarefiée*) layer enormously hypertrophied. The operation was followed by no serious accident; only that the skin in the neighborhood continued hypertrophied after the cure of the wound, so that the patient remained almost as deformed as before the operation. I have since seen two instances of similar tumors, one at the nape and the other at the middle of the back. A third fell under my observation in November, 1838. A man 45 years of age had on the median line, or a little to the right of the anterior half of the cranium, a tumor which at its point descended down to the forehead, and was prolonged upwards to a line with the parietal protuberance. This tumor which had formed gradually and without any appreciable cause, and which appeared to be situated upon an incipient exostosis, had perhaps like the preceding been produced by the repeated frictions to which the diseased region had been subjected, and was moreover movable, without any well-defined limit, and in every respect indolent. In whatever manner it was attempted to displace it, it was always possible to recognize in it a disc or plate of integuments excessively thickened or distended, with an entire absence of degeneration or transformation of tissues. But for fibrous tumors being unaccompanied with this last feature, I should in fact deem those of which I speak a species of flattened elephantine tumors of very limited extent.

It follows from these remarks, that in order to effect a perfect cure, it is necessary to remove at the same time with the tumor, every portion of the skin which is adherent to it or constitutes a part of it. In the three last cases therefore I have just mentioned, I refused to operate, inasmuch as extirpation is not in my opinion justifiable, but for those tumors which continue to increase, or which become the source of serious accidents. Some other fibrous tumors, which also include the skin in their composition, are however distinguished from the preceding in these particulars, viz: that well-defined limits soon become established between them and the sound tissues, that the elements of which they are constituted are no longer in a normal state, and that they seem susceptible of dangerous degenerescence and transformation. A man of about 50 years of age, and who came to the hospital of the faculty in 1825, had in his right groin a tumor of this

description, which was of half the size of the head, and extended obliquely from a line with the vessels as far as to the posterior part of the thigh below the scrotum. It was extirpated by M. Roux, and we found that the entire tumor was homogeneous, and formed of a tissue, the section of which presented some analogy to that of Gruyère cheese. The patient got well, but in the following year there returned a similar tumor, which was also extirpated; without however preventing him from succumbing at a later period to the effects of a schirrous tumor which formed on the front part of the pubis. As to fibrous tumors, which are independent of the skin, they may be developed upon almost all the regions of the body and especially in the sub-cutaneous tissue. In a woman operated upon successfully by M. D. Lasserve, (*Cas de Chir.*, etc., p. 17, gg. 1. Perigueux,) he was enabled to extract a fibrous tumor of twice the size of an egg situated upon the upper lip, in such manner from the midst of the tissues as to leave but very little deformity. A patient in whom M. M'Farlane (*Encyclop. des Sc. Méd.*, 1833, p. 56,) had removed a fibro-cartilaginous tumor which was situated upon the side, between the transverse and oblique muscles, died of peritonitis in the course of 31 hours. A young lady on the contrary who had above the crural arch, a fibrous, movable tumor, of the size of a small egg, recovered perfectly from the operation which I had recommended to her, and M. Yvan junior has communicated to me a similar fact. A patient who had one of the size of a large nut on the dorsum of the metatarsus, came to have it extirpated, at the hospital of La Charité in 1836. Having divided the integuments by a simple incision, I seized the tumor with an erigne and proceeded immediately to its removal. The consequences of the operation were simple, and the tumor did not reappear. Another patient operated upon in 1837 at the same hospital, for a tumor in every respect similar, and which was situated two inches above the external malleolus, between the tendo achillis and the fibula, was cured in the same way. I have removed from the breech of an adult man a fibrous tumor as large as an egg, which did not go deeper than the aponeurosis and was never reproduced. Another patient whom I operated upon in 1835, had one of the same nature between the anus and tuberosity of the ischium. The cure of this also was radical. But a woman who had one of these tumors on the dorsum of the point of the sacrum, and which adhered throughout its deep-seated surface to the periosteum, thus rendering its dissection sufficiently delicate, was seized with an ichorous suppuration, caries of the pelvis and general accidents, which caused her death at the expiration of a month. Tumors of this description which I have met with in the breast or the head, will be referred to again in other articles. I will merely add that whatever be their situation, if the skin which covers them shall be found too much attenuated or actually degenerated, it will be advisable to remove an ellipse from it or take it away entire at the same time as the tumor, rather than attempt to dissect it. A young girl of eleven years of age had on the radial and dorsal side of the root of the middle finger, a hard, bosselated, blackish-looking tumor of the size of a large nut. With this tumor, which I isolated from the hand while respecting the metacarpo-phalangeal

articulations and neighboring extensor tendons, I removed also a flap of integuments one inch in length and six lines in width. A strong and robust man had, from the age of 20 years, above the outer malleolus, a globular and very movable tumor covered with attenuated reddish-colored integuments. Having seized this tumor with an erigene, I circumscribed it in an ellipse of the skin, and removed the whole of it while dissecting its deep-seated surface. By this mode, the operation is prompt and certain, and ought to have the preference when it does not cause too great a loss of substance. With these exceptions, fibrous tumors must be submitted in every respect to the rules of treatment indicated for lipomatous tumors.

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## CHAPTER X.

### CANCEROUS TUMORS.

All the tumors of which I have hitherto spoken, come within the class of tumors denominated *benignant* by the English surgeons. Those on the contrary designated under the title of cancerous tumors, have a character of *malignity* which has always served to distinguish them from the others. Their tendency to repullulate and to multiply without end, has ever constituted them the opprobrium of surgeons. If they are attacked on one side, they soon reappear on the other. Frequently the most simple operation will be sufficient to irritate (*exaspérer*) them and aggravate all their symptoms; no method of treatment, even at their first appearance, can promise any certainty of effecting their radical cure. There are a great many surgeons moreover, who advise that we should do nothing with them, or make use only of palliative means. Nevertheless, upon the supposition that these tumors are primarily a local affection, and admitting also their malignant character, I lay it down as a principle to destroy them as soon and as effectually as possible. To me it appears evident, that if there is even room to hope for their cure, it must be by means of their mechanical or chemical destruction, and by attacking them before they have had time to introduce new morbid germs into the rest of the system. All the varieties of tumors however, denominated cancerous, do not exhibit the same tendency to repullulate. Those which in this respect should be placed at the head are the *melanotic* (*mélaniques*) tumors; then come the *encephaloid* tumors; *scirrhous* tumors would be placed in the third line, and the *colloid* at the bottom of the scale. These particularities, which I will discuss more at length while speaking of the extirpation of the breast, convey an idea of the course which the surgeon ought to pursue in regard to the prognosis and treatment of cancerous tumors in general.

#### § I.

Should the tumors be purely melanotic, composed of flocculi or clots of anthracine, we should avoid performing the slightest operation

upon them, provided there existed at the same time with the principal nucleus some spots or granulations of the same nature, either in the neighborhood or in other regions, even though the patient should in other respects appear to be in excellent general health. A man in other respects in good health, came in 1834 to the hospital of La Pitié for the removal of a melanotic tumor upon the temple, of the size of a large nut. This tumor, which M. Olivier of Angers had extirpated a year before, and which had scarcely then the size of a small nut, had reappeared only since the last three months. All the internal organs performed their functions freely. No other tumor existed upon the surface of the body, and the patient, who considered himself in other respects in perfect health, retained also all his natural embonpoint. I extirpated the tumor; the operation presented no difficulty, and everything went on well for about twelve days. The wound then became sanious, general symptoms made their appearance, and death took place six days after. The opening of the dead body disclosed the fact that innumerable melanotic tumors existed in the interior. The liver especially was riddled with them; they were found here in hundreds, some having the size of an ordinary pin's head, others equalling that of a small egg, and all presenting precisely the appearance of truffles, either in their crude state or reduced to pulp. A patient who for twenty years had had a melanotic tumor (*grumeau*) on the dorsum of the foot, without ever having experienced the slightest symptoms of general disease, desired in the month of October, 1838, to have it removed. The tumor, which was only of the size of a small nut, was readily extirpated. Seeing that the suture of the wound threatened to cause a phlegmonous erysipelas, I returned to the simple dressing and union by the second intention. Up to the present time there is no appearance of a return of the disease. But will this cure remain permanent? A woman who had undergone amputation of the great toe for a similar tumor, was not yet cured of her wound when the ganglions of the groin and iliac fossa had already become attacked to such an extent that in less than a month she had in those regions enormous black masses, which soon caused her death. However slight therefore may be the grounds for believing that there shall exist any remote engorgement or internal derangement, the surgeon should rank melanotic tumors in the category of the *noli me tangere*.

### § II.

In the case of *cerebroidal* (*cérébroïdes*) tumors, we must proceed nearly in the same way. Nevertheless, if the disease exists in a subject who is still young and in other respects in good health, and if the lymphatic ganglions situated above remain wholly unaffected, and the tumor is of recent date and perfectly well defined, the chances of cure are assuredly greater and more numerous than in the case of melanotic tumors.

### § III.

In a *scirrhus* tumor there is less tendency of reproduction in the midst of remote organs; but more frequently than the two varieties of which we have been speaking, it reappears upon the place only or

in the neighborhood of the part which the first tumor occupied. It is because this class of tumors present themselves under the form of a degenerescence or transformation of the natural tissues, as well as under that of abnormal productions and simple foreign bodies. It results from this that a scirrhous is usually badly defined, and that it often sends out to the circumference radiations or roots whose terminations cannot be traced without difficulty. Moreover, it is advisable when we have decided upon operating, to remove at the same time a sufficiently large proportion of sound parts, and we should abandon the attempt to relieve the patient, if there existed in the neighborhood of the tumor, either beneath the skin or even in the substance of the integuments, the slightest indurated plate (plaque) or smallest lardaceous radicle that could not be extirpated. In cases of melanosis and encephaloid matter, our attention is to be directed towards the condition of the remote organs; while in cases of scirrhous on the contrary, it is the vicinity of the tumor which is to be specially examined.

#### § IV.

*Colloid* tumors, which besides being sufficiently rare, often attack the bones, have this peculiarity, that they usually remain local, and well defined like cerebroidal tumors, at the same time that they seem to be concentrated on the organ which was their primary seat. It is these, consequently, in which the operation presents the most chances for success.

#### § V.

The operations proposed for cancerous tumors are the same as those for the tumors designated in the preceding articles. It is not my intention at this moment to speak either of internal remedies, or of the topical applications purely discutient or resolvent that have been so much lauded by some persons; experience having proved that such means are totally inefficient when legitimate cancerous tumors are under treatment. I would say the same of compression, if it had not found among us new advocates. For myself, I do not believe that compression has ever radically cured or dispersed tumors belonging to either of the four kinds which I have just been treating of. If it should be contended that it at least has the advantage of lessening or extinguishing the engorgement, and thickening of the neighboring tissues, (*l'empâtement du voisinage*), and of thus rendering the other operations more easy, I would reply, that this is a specious argument which cannot sustain a close examination. In fact, cancerous tumors are not generally accompanied but with a very slight engorgement of the surrounding parts; moreover, to have any real hope of success, it is important to remove with the tumor a sufficiently large portion of sound tissue. But what would compression do in a case of this kind? Suppose it should have shrunk the tumor and diminished its volume; the instrument might be carried nearer to its confines, but we should to the same extent increase the chances of a return. Unless, therefore, inflammation or chronic engorgement of the cellular tissue should have been established around the principal disease, compression must be rejected from the *curative* treatment of cancerous affections.

A. *Cauterization*.—The destruction of cancers by means of the hot iron or chemical caustics has been eulogized at every epoch. In spite, however, of the successes obtained by means of their powders or pastes, they had been generally renounced by Rousselot, and Frère Cosme, when their efficacy has been again announced by practitioners in Germany, England and France. Arsenical caustics and nitrate acid of mercury, besides being hardly applicable except to superficial cancerous plates, have, moreover, the inconvenience of being partially susceptible of absorption, and of thus exposing to actual poisoning. The zinc paste, introduced into practice by M. Canquoin, having the property of mortifying the tissues in the manner of a punch, to such depth as is desirable, would always deserve the preference if it would adapt itself to the anfractuosities and inequalities of certain tumors, or did not exact the previous destruction of the epidermis. Whenever this paste cannot be applied with facility we may make use of the Vienna caustic or paste, which has the advantage of being introduced in the manner of a pulp into every possible chink, and of moreover cauterizing with great energy ; (see Vol. I.) Potash so called, butter of antimony and the concentrated acids are, therefore, excluded from the catalogue, in consequence of their tendency of fusion into the sound tissues, and their uncertainty. But caustics, of whatever description they may be, ought they to have the preference over the operation, when the question under consideration is cancerous tumors ? On this point it is necessary that we should understand ourselves ; if the skin is sound and the tumor movable, and can be cut out by a bistoury so as to leave a wound whose lips may be more or less perfectly approximated, caustics will not be admissible except in those patients who absolutely refuse extirpation. If the tumor has more width than thickness, includes the integuments, is ulcerated upon its surface, is situated at the bottom of an ancient wound, and prolonged into some cavity to a great depth, and soldered (*plaquée*) as it were against the bones ; if, in a word, it is not possible to remove the cancer without causing a loss of substance equal to the integuments, then caustics, and the zinc paste, especially that of Vienna, may be made trial of, and would in some cases even deserve, I think, the preference.

B. As to the *cutting instrument* and the ligature, they should be employed here according to the rules which I have pointed out under other tumors, especially for fungous sanguineous tumors. I shall, however, return to this subject in detail in treating of tumors of the breast. This last remark renders it unnecessary for me to treat of cancerous tumors according to the regions or organs they attack. I will only add that for a tumor of the foot, which extended to the bones of the tarsus, I deemed it proper to amputate the leg ; that in a case of cerebroid tumor of the calf, I amputated the leg at the knee ; that an enormous mass of the same nature which occupied the leg of a young sailor, induced me to give the preference to amputation of the thigh ; that for a scirrhouss tumor of the metacarpus, I amputated the wrist ; that for a colloid mass upon the radius, I amputated the fore-arm ; that analogous tumors have induced MM. Luke, Janson, Roux, Castara and others, to amputate the shoulder ; that I have disarticulated the arm for a disease of the same kind ; and that as a general rule

we ought to prefer amputation of the limb to extirpation of the tumor, whenever the disease penetrates to the neighborhood of the bones, so as to implicate a portion of the muscles, nerves, and large vessels. Underneath the skin, on the contrary, and in the substance of the tegumentary tissue, it is advisable to treat cancers by simple extirpation, or by caustics. A woman who had a cerebroid plate as large as the hand between the umbilicus and the epigastrium, was cured by means of two applications of the zinc paste. Another woman, who had upon the thorax, below the left shoulder, an analogous plate which was hard and without ulceration, was relieved by the following process: having raised it up a little, I glided the knife under it flatwise, and immediately detached its lower half, completing its isolation with a second cut by returning the edge of the knife from above. The wound, which did well during fifteen days, having taken on a sanious aspect, and become covered with inequalities of a bad appearance, the idea suggested itself of covering it with a layer of zinc paste. After the fall of the eschar, the wound went on rapidly to cicatrization. I have met with and destroyed plates and tumors of the same description upon the leg, thigh, around the knee, at the breech, upon the side, in front of the chest, on the side of the neck, and upon the cranium and face in an infinity of cases, but without the operative process having exacted any thing special that requires to be related here. It will also be under the head of cancerous tumors of the breast, that I shall have an opportunity of discussing the advantages and inconveniences of immediate or secondary reunion, and the different kinds of anaplasty that may be employed after the removal of cancers in general.

#### [CANCEROUS TUMORS.]

In thirty cases of *cancerous tumors of the breast* treated by M. Tanchou, (see *Journ. des Connaiss., &c.*, de Paris, Dec., 1842, p. 253,) he has obtained, he asserts, ameliorating results, and more or less complete dispersion of the tumors, by means of *graduated and methodical compression*, by compressors specially adapted to this purpose, and also by external applications of sachels containing iodate of potash, pulverized sponge, (*éponge en poudre*—meaning, probably, burnt sponge, a remedy of 2000 years' standing in bronchocele,) chlorhydrate of ammonia, and chlorhydrate of soda; also other compounds made with the powder of sponge, nitrate of potash, and Florentine iris. He proscribes all surgical operations.

M. Martinet de la Creuse has ingeniously proposed, and several times succeeded, (see Malgaigne's *Manuel de Méd. Operat.*, 4th edition, Paris, 1843, p. 118,) in making for the wound, after extirpating scirrhouss and carcinomatous tumors, a healthy flap of sound skin borrowed by the anaplastic method from the neighborhood.

M. Ollivier, who has otherwise written so well on these tumors, proposes the daring expedient (*op. cit.*) of inoculating their centre with hospital gangrene!

From statistical observations obtained by M. Leroy d'Etiolles, from every department of France, (see the result of these researches communicated by him to the Academy of Sciences of Paris, February

20, 1843, in the *Journ. des Connaiss., &c.*, of Paris, Mai, 1843, pp. 214, 215,) on the subject of *Cancerous Diathesis and Degeneration*, we learn the fact that out of *two thousand seven hundred and eighty* cases, communicated from 174 practitioners in those departments, there were 1192 who were not operated upon, or who died with the disease upon them. Of these, 18 lived more than 30 years after the development of the disease, which, after reaching a certain point, remained stationary and indolent. But out of 801 operated upon, either by the knife or caustics, *four* only lived to the same length of time. Of those who lived from 20 to 30 years, we find 34 who were not operated upon, and 14 in whom an operation was performed. Of those who lived from 6 to 20 years, there were 88 who were operated upon, and 228 in whom the tumor was not extirpated. So that the balance in cancerous tumors, so far as the prolongation of life is concerned, is clearly not in favor of the operation.

So far as regards a short term of existence, the difference appears to be in favor of the operation; thus counting from the first appearance of the disease, the average prolongation of life in those not operated upon is, for men, five years, and for women, five years and six months; while in those operated upon, the average, for men, is five years and two months, and for women, six years. And in these cases, we find the average of time that expired before the operation was, three years and nine months for men, and the time after the operation, one year and five months only; while for women it is three years and six months before, and two years and six months after the operation.

To those who say that the return of the disease is too often owing to the operation for extirpation having been procrastinated, by which time was allowed for degeneration to be established, M. Leroy d'Etiolles replies, that among the numbers in this table in whom the disease was reproduced, 61 had the tumor extirpated in less than a year after the disease made its first appearance; and that 30 patients who were operated upon five years after its first development, did not have a return of the disease, and that the same result occurred in 22 others who were not operated upon until more than ten years after the first appearance of the disease.

In conclusion, M. Leroy remarks, that though it may be impossible to determine beforehand, whether a tumor will remain stationary or become cancerous, it is worthy of investigation to ascertain if the *cancerous diathesis* does not produce in the subjects in whom it exists, certain characters (as for example, a change in the condition of the fluids of the economy,) by which it may be recognized.

#### *Fibrous Tumors (corps fibreux) in general—Fibrous Tumors of the Breast (corps fibreux de la mamelle.)*

The justly distinguished M. Cruveilhier, in a memoir read before the Paris Academy of Medicine, on *Fibrous bodies of the Breast*, (*des corps fibreux de la mamelle,*) (read Jan. 9, 1844—see this memoir in the *Journal des Connaissances Medico-Chirurg.*, Paris, March 1, 1844, p. 8 to p. 93,) conceives that they have not been sufficiently studied, that they are a very frequent disease, (lesion,) and that they are constantly confounded in practice with scirrhouss and indurated

cancer of these organs, and as such, subjected to extirpation. He believes that such tumors are incapable of degeneration, that they never require extirpation, that they are in some sort functional, ( facultative,) that when extirpated they are never reproduced, (ne répullulent jamais,) in the proper sense of this word, but are a purely local lesion and organic production, independent of every kind of general infection of the economy, whether as a cause or effect.

Neither Boyer nor Sir Astley Cooper have mentioned this disease, nor is it more than obscurely alluded to by more modern writers.

*Fibrous Bodies in general.*—Such growths were for the first time described by Bayle as found existing in the uterus. Like Bichat, however, who considered that each tissue had its own lesions, he erroneously thought these bodies were confined to the uterus. True, the conditions in this organ are most favorable to their production and development, but they are met with in all organs where fibrous tissue is found, and are composed of two orders: 1st. As *vegetating fibrous bodies*, growing from, or implanted in, (implantés,) a membranous surface in the manner of a vegetable, like fibrous polypi of the nasal fossæ, formed at the expense of the periosteum; fibrous tumors of the dura mater; and fibrous, cartilaginous and osseous tumors, which grow from the periosteum of the bones and which may be called *osteo-chondophyte*. 2d. As *non-vegetating fibrous bodies*, (les corps fibreux non-implantés,) which grow in the interior of the organs, (au milieu des organes,) such as the fibrous bodies of the uterus, those of the breasts, ovaria and testicles.

Their *general characters*, according to the author, (M. Cruveilhier,) are: 1st. That of *situation*, always in the midst of the fibrous tissues. 2d. That of *form and size*. Their form is generally spheroidal, sometimes irregular upon the surface, sometimes mammellated, at other times deeply furrowed, (sillonnée,) giving rise then to the lobular arrangement. Their size varies from a cherry-stone, or even a millet-seed, to that of the head of an adult, or even greater, their weight being sometimes equal to 45 demi-kilogrammes. 3d. *The characters deduced from the mode of adhesion and connection of the fibrous bodies, with the tissues, in the midst of which they are developed.* Vegetal fibrous bodies (above) seem to be mere prolongations of the tissue of the organ, but all other fibrous tumors are united to the parts in which they are developed, only by means of an exceedingly loose cellular tissue, so that these bodies may be enucleated with the greatest ease by means of the finger, a blunt probe or slight traction, *without ever requiring the aid of a cutting instrument*. In this respect these bodies are, in their isolation or independence of organization, similar to *encysted tumors*, with which also they are sometimes confounded. 4th. *In their characters of texture*, fibrous bodies or tumors are of an extreme density, similar to cartilage, or to the unimpregnated uterus proper. If the fibro-cartilaginous tissues of Bichat could be sustained, fibrous bodies would come under them. These bodies are, in fact, composed of parts arranged *linearly* and belonging to the albugineous tissue, strongly pressed against each other, interlaced together in every possible direction, and often divided into many groups of fibres, and pelotoned (pelotonnées) in such manner as to constitute distinct masses or lobules. They are provided with veins whose

trunks are on the surface, and their minute branches distributed to their substance. When these tumors are lobulated, veins of greater or less size are found in the intervals of the lobes. These veins communicate directly with the proper tissue of the organ in which the tumors are. No *arterial vessel* can be traced into these tumors— injections from the neighboring arteries will not penetrate them, and no lymphatic vessel or nerve has yet been shown to exist in them. They therefore possess no other organic element than a fibrous tissue, supported (*animé*) by veins, and are reduced down to an obscure nutrition sustained by a feeble oscillatory movement of venous blood.

5th. *The evolution of fibrous bodies* presents the same characters at their first appearance as at their complete development, whether the tumor be only of the size of a cherry-pit, or has attained that of the fist (*poing*) or head. Facts have satisfactorily established, in the mind of M. Cruveilhier, the conclusion that if some of these bodies are primarily fibrous, and afterwards become cartilaginous or osseous, a number of them will present one or other of these last mentioned characters from the beginning. 6th. *The consecutive pathological characters* of fibrous bodies are: *a.* The consecutive results produced by fibrous bodies on the surrounding tissues, which consist only in the inconvenience occasioned by their weight, being in truth nothing more than parasitical foreign innocuous growths, having a peculiarly limited vitality, which causes no other change in the tissue in the midst of which they are developed than some indispensable modification of nutrition and circulation; *b.* The consecutive changes which are effected in the fibrous bodies themselves, and which are exceedingly limited. These bodies may indefinitely increase, or they may remain stationary. Many facts authorize M. Cruveilhier to believe that they are susceptible of an actual diminution of volume, or a sort of atrophy, or may become encrusted or penetrated with phosphate of lime, or the seat of an *œdema*, which dissolves the elements that enter into their composition and makes manifest their lobular arrangement. In this case, the tumor is often impregnated with a liquid which possesses, in appearance at least, much analogy to that of *synovia*.

*Fibrous bodies are incapable of cancerous degeneration.* "I believe also," says M. Cruveilhier, "that I am sustained in saying (and this character is of the highest importance) that there is an incompatibility between fibrous production and cancerous degeneration."

To ascertain if these general characters apply to certain organic productions observed in the mammae, he invokes a great number of clinical facts, and some from pathological anatomy. Of all other secreting organs in the animal economy, the mammary gland, says M. Cruveilhier, presents the greatest quantity of fibrous tissue, and has besides adipose tissue, two essential elements that enter into its texture; viz., 1. A fibrous woof (*charpente*) or gangue; 2. Glandular granulations or grains, which latter cannot be well examined, except in women who have died during pregnancy, and especially after parturition, during any period of lactation; that except under these circumstances, mammary granulations are but very little developed, which feeble development is then in correspondence with the almost complete absence of secretion in this organ; that after the cessation of the menses, and especially in very old women, the granulations

seem to disappear entirely, leaving the fibrous woof only remaining. The mamma, therefore, possesses in a high degree, the conditions favorable to the development of fibrous bodies.

In the mammae, the fibrous bodies or tumors appear as small spheroidal tumors, from the size of a millet-seed or cherry-pit to a pullet's egg, or larger. Their surface is sometimes uniform, or mammellated (mamelonée), and their hardness is extreme, or as it were, stony (pierreuse). Generally sub-cutaneous, they may also be developed in the midst of the tissues of this organ; and are for the most part circumscribed, perfectly distinct from the tissue of the mammary gland, adhering to it only by a very loose tissue, apparently perfectly independent of this gland; they possess the mobility of a lymphatic ganglion, (i. e. gland,) and like that roll under the finger, from whence doubtless the name of *glands*, given to them in common parlance.

Thus are these characters precisely those that M. Cruveilhier has given of fibrous bodies in general.

The absence, hitherto, of all clinical and anatomical descriptions of fibrous bodies has caused them to be constantly confounded with other lesions of the breast, and especially with scirrhouus degenerations of that organ—giving rise to the same rules of treatment, and the same prognosis as applicable to both. In respect both to fibrous bodies and to scirrhouus degenerations, it has been asserted that such fibrous tumors of the breast as are commonly called glands, may exist for a long time without undergoing any perceptible growth, but that after 40, 45 and 50 years of age, they increase with great rapidity, and invading the surrounding parts, vitiate the whole animal economy, and present all the characters of an incurable cancer. Hence, as the consequence of such ideas, was that of the necessity of immediate extirpation—and that the sooner, therefore, this was done after these tumors appeared, the less the danger. This was the sole mode of treatment; not that practitioners asserted that such degeneration must always ensue, but being ignorant of any diagnostic marks between cancerous tumors and those incapable of such degeneration, “they preferred ten unnecessary extirpations to the omission of one that was absolutely essential.”

Even so little has been known of the pathological anatomy of mammary lesions, that encysted tumors themselves and œdematosus indurations of these organs, are usually confounded with cancerous tumors, and often submitted like the last, to the general law of extirpation. “Such also, (says M. Cruveilhier, with great candor, while advocating, distinguished anatomist and surgeon as he is, humane doctrines so honorable to him, and so plainly deducible from the important truths he discloses to the profession,) was my rule of conduct fifteen years since. I postponed the advice to extirpate only to obtain time to prepare the patient for this operation, finding him always tranquil and resigned, when the terrible word *cancer* was pronounced.” Doubts, however, even then arose in M. Cruveilhier's mind, and especially from seeing in young girls, scarcely arrived at puberty, and in young women in rosy health, numerous cases of movable, rolling, circumscribed, indolent, and isolated tumors; and also from seeing a number of these tumors in the same breast, or simultaneously in both breasts. He asked himself the question if

such little tumors, whose discovery was so often due to chance, ought in reality to be considered a cancer in its first stage. This suggestion was strengthened by finding that many women who had refused to be operated upon, or in whom he had deferred it, went on for a great number of years under his observation, without any perceptible increase of size or degeneration in such tumors, though many such women had become pregnant, and suckled their children, and many of them had passed their critical period of life.

The fact of non-reproduction (*défaut de répullulation*) after extirpating tumors of this kind, may also be adduced as a clinical proof of the innocence of these tumors, and their totally foreign character to that of cancerous degeneration; for it is well known how common it is for true mammary cancers to grow again after their removal.

Proofs deduced from pathological anatomy, in favor of these positions, were soon obtained by M. Cruveilhier. An examination of a great number of mammary tumors extirpated for scirrhus or incipient cancer (*à l'état de crudité*) convinced him that several of them exhibited the same character of form, density, and texture, as the fibrous bodies of the uterus, and offered in no respect any of those of cancer. One important fact was established by this eminent anatomist, viz: that a number of fibrous mammary tumors, which, on examination, appeared at first to be full (*pleines*, i. e. round, uniform and smooth) were found, to be arranged after the manner of geodes (*géodes*). That is, on dividing them in two equal halves, each half could be turned inside out, upon itself, so as to form a hemispherical cavity, whose internal surface was then formed by the external surface of the tumor, and whose external surface was formed by the surface of the incision. But this now external surface was thick set (*herissée*) with globular vegetations or fibrous granulations, some of them isolated, and others that were branched after the manner of a polypus; these fibrous vegetations or globules, which were superposed on each other (*qui se modelaient les unes sur les autres*) being sometimes free, and at other times adherent to each other by means of small prolongations. These adjoining (*juxtaposés*) fibrous vegetations, knots or swellings, in the cases described, constituted a cavity without walls. In some cases, there was found in the centre of these fibrous bodies, a cavity filled by a viscous fluid, analogous in appearance to synovia.

M. Cruveilhier has had occasion to see many œdematous fibrous bodies of the breast, which had rapidly acquired a great size and were speedily extirpated, and which bodies corresponded exactly with the fibrous bodies of the uterus, their mass being penetrated by a viscous humor, similar to synovia, and their centre here and there occupied by numerous geodes, without membrane or cyst, and filled with a liquid matter. In conclusion, M. Cruveilheir remarks that he considers himself upon the strength of such facts, obtained from clinical observation and pathological anatomy, justified in adopting these propositions:—1. The mammary gland is subject to the development of an organic production known under the name of *fibrous bodies*. 2. That the fibrous bodies (or tumors) of the mamma, which constitute one of the most frequent lesions to which this organ is liable may be distinguished by certain signs from that kind of induction, which succeeds to chronic inflammation, and also from can-

cerous tumors; the tumor neither in chronic inflammation, nor in cancer, being in any manner distinct from the mammary gland itself, at the expense of which it is formed, and with which it is continuous without any line of demarcation; while the fibrous bodies are completely detached from the mammary gland and roll under the finger in the manner of a cyst or lymphatic gland (ganglion). 3. That as these fibrous bodies are incapable of cancerous degeneration, extirpation is not necessary, upon the supposition (*en tant que*) that these bodies may endanger the life of the patient, by the ulterior changes which may take place in their interior. Fibrous bodies constitute a lesion which is essentially local; their extirpation is, so to speak, contingent (facultative), and would not be requisite unless from the inconvenience caused by their weight and size. After fibrous bodies are extirpated, they never grow again, (*répullulent*) in the proper sense of this word; though new fibrous bodies may be developed in a breast which has been the seat of a previous extirpation.

At the sitting of the Paris Academy of Medicine, (January 16, 1844,) following that at which M. Cruveilhier read his memoir, an animated discussion arose among the members upon the merits of the new doctrines therein advanced. As this discussion (see *Journ. des Connaissances, &c.*, Paris, March 1, 1844, p. 124, &c.) was one of a practical bearing, maintained energetically through a number of sittings of the learned body alluded to, it will not be improper briefly to notice the leading points and views of some of the most eminent surgeons of Paris, (especially as our author, M. Velpeau's own views are also given in the debate,) to show what conclusions also their experience in the rapid progress of surgery, has led them to form, up to the present epoch of the history of our art.

M. Blandin considered *fibrous* tumors of the breast rare as compared with the ordinary tumors of that organ, and especially with its encysted tumors. He also believed fibrous tumors capable of degenerating, that it was impossible to distinguish them from cancer, and that there was no danger in extirpating them. M. Rochoux had found by the microscope scirrhouss matters scattered through the interstices of these fibrous tumors. M. Gerdy did not always consider their diagnosis easy: as an example he mentioned fibro-cartilaginous lobular tumors, making a crepitus under the scalpel, &c., and having the same characters as M. Cruveilhier's tumors, and also as Sir Astley Cooper's *irritable tumors* of the breast. Though fibrous tumors may possess analogies to fibrous tissue, they differ from it. He has found three sorts of tumors: benign, malignant, and the doubtful, which may degenerate. The second exhibit a depression of the skin at the centre, when the tumor is compressed between the hands, and are marked by peculiar lancinating pains.

M. Velpeau admitted that there were, in fact, mammary tumors which did not degenerate, but he did not consider them in reality the same as the *fibrous* tumors of M. Cruveilhier, which latter are susceptible of this change. M. Velpeau considers this peculiarity to belong to tumors which he denominates *fibrinous* (*fibrineuses*), caused by the extravasation of the fibrine of the blood after a blow or a contusion. M. Cruveilhier, as M. Velpeau thinks, has included such tumors under his fibrous order. The microscopic characters of fibri-

nous tumors have, according to M. Velpeau, been satisfactorily ascertained by M. Mandl; in fibrinous tumors, the microscope discloses nothing but fibres and fibrilli. But the characters during life are not always recognizable, and it is rare that we meet with such tumors except in young people; in other words, we meet them more frequently in that class of persons. M. Velpeau does not believe fibrinous tumors of the breast capable of degenerating, any more than those of the uterus, at least such a result must be rare. He blamed M. Cruveilhier for not having entered more into the subject of the treatment, and for confining himself to proscribing the operation without pointing out some other therapeutic means. For his own part, considering that both fibrous and even indolent tumors, rarely present characters of a very satisfactory nature, and that they are a source of perpetual disquietude to the patients, he is of opinion that they should always be removed (*les operer*), this method having at least the advantage of giving confidence to the patient as well as physician, (loc. cit. p. 125.)

M. Cruveilhier expressed himself gratified with the remark of M. Velpeau, that fibrous or fibrinous tumors were not susceptible of degeneration; with which opinion also M. Moreau coincided. M. Roux (loc. cit., p. 125) thought the consequences would be disastrous if the principles of M. Cruveilhier were admitted. He apprehended the latter had taken for his type of fibrous tumors of the breast those that are called fibrous bodies (i. e., tumors or growths) of the uterus, two things essentially different. He denied also that one of their characters was that of being encysted, as encysted tumors must enclose a liquid, and such tumors are rarely fibrous. He admitted that many tumors did not degenerate; a prognosis to this effect was a subject of immense difficulty, and could only be made of young persons. He himself confessed, (and where was the surgeon who had not) that he had extirpated tumors as cancerous which were not so. He would not pretend to declare that fibrous tumors never degenerated, but thought they did not do so spontaneously, but might become degenerate (i. e., cancerous or malignant) under certain circumstances. He opposed as dangerous, the principle (loc. cit. p. 126) of M. Cruveilhier, that the operation should be conditional (facultative); M. Roux thinks it better to operate even under this point of view. He notes the omission of M. Cruveilhier to give the characters of benign tumors: M. Roux says, in fact, there are none such; they may however, in rare cases, be absorbed by some spontaneous process or by means of local resolvents. The operation is rarely fatal, and its moral effect alone is a matter of great importance, seeing that the tumors do not return. M. Cruveilhier, in rebutting the ideas of M. Roux, also remarked that what were called *strumous* tumors of the breast were also confounded with the fibrous; but that such *strumous tumors* were *neuromas* and not *scrofulous*. He went so far as to say that the existence of fibrous tumors in the uterus was an *immunity against cancer in that organ*. M. Amussat denied the frequency of fibrous tumors of the breast; thus the Dypuytren museum, so rich in fibrous tumors of the uterus, is exceedingly deficient in those of the breast. He believed they would degenerate, and was in favor of operating always for such tumors, and even for a simple

lipoma (loupes). M. Bérard also took ground against the opinions of M. Cruveilhier. M. Lisfranc considered fibrous tumors of the breast exceedingly rare, as he had ascertained from having extracted an immense number of tumors of the breast. Yet such as M. Cruveilhier describes were not uncommon. He does not think them exempt from degeneration: and expressed himself diametrically hostile to the doctrines of M. Cruveilhier.

M. Castel (loc. cit., p. 164) called attention to the opinion of Bichat that the glandular tissue is as widely different as possible from the fibrous tissue. M. Cruveilhier remarked that the chief difference between him and his colleagues arose from their attaching a different meaning from him to the phrase *corps fibreux*. M. Blandin thought (loc. cit., p. 168) the therapeutic part of this question was overlooked, and stated that he considered it impossible to diagnose such tumors. He thought the idea too dominant on M. Cruveilhier's mind, that cancer was also constitutional and must return after an operation. M. Blandin maintained also, that a cancerous condition and fibrous tumors were not incompatible. These fibrous tumors of the breast are so rare that some practitioners, who have frequently removed tumors from the breast, declare they have never met with them, as MM. Laugier and Blandin. M. Blandin explained the non-degeneration of fibrous tumors of the uterus at Salpêtrière, because they were usually old women whose constitutions were dried up—not young, in whom the natural moisture and fluids of the parts favored such degeneration. He avers that fibrous tumors of the breast may become the germs of cancer; for, as M. Andral says, why should not the abnormal fibrous tissue degenerate into cancer when it is admitted that the normal does. M. Blandin alluded to the tumor removed by him from the vault of the palate and shown to the Academy, and admitted by M. Cruveilhier to be cancerous—proved so in fact, and to be both fibrous and cancerous by M. Mandl, who saw in it the cancerous globules scattered upon a groundwork (canevas) of pelotones of fibres—which proof of degeneration of fibrous tumors into cancer, is to be added to a similar one of Dupuytren in respect to those of the fibrous polypi of the nose. M. Blandin cited two other cases where this cancerous degeneration became even encephaloidal, and yet its removal was not followed by a return of the disease. If it be admitted, says he, that we cannot make a certain diagnosis of fibrous tumors of the breast, and at the same time that we deny the possibility of their degeneration, then ought we also to operate upon all indurated tumors which are not resolvable.

M. Cruveilhier maintained (loc. cit., p. 169) that the tumor from the vault of the palate mentioned by M. Blandin, was not a fibrous body become cancerous, but an instance of *fibrous cancer*, a very different thing. The various abnormal productions always preserve their peculiar characters; they do not undergo transformation, since cancer remains cancer, and tubercle continues tubercle, in the same way as fibrous bodies continue to remain fibrous. He acknowledges that *encysted cancers* are never reproduced, but unlike M. Blandin, he deems them exceedingly rare.

M. Gerdy (loc. cit. p. 212,) thought a difficulty arose in this discussion from each one dwelling upon the peculiar characters of

tumors separately, instead of viewing them in their *ensemble*, when we should discover a certain class of tumors, which may be distinguished both from scirrhus and from degenerate tumors. Thus, in considering these characters as a whole, when we find the simultaneous existence in the two breasts, or in one alone, of numerous small tumors, which are hard, elastic, indolent, rolling and clearly isolated, and the absence of cutaneous folds or depressions when the breast is pressed between the fingers, as is so accurately described by Sir Astley Cooper, we can no longer doubt that such are *fibrous tumors*. Difficult as the diagnosis sometimes is, there is this thing certain, that we should not operate when the tumors are clearly benign; in the opposite case, or if we are in doubt, we should operate. M. Dupuy considered that the only difference between scirrhouss tumors that degenerated and those that did not, lay in hereditary predisposition. M. Lisfranc thought the less frequency of uterine cancer, dated from the discovery of the operation, which disclosed those ulcerations that are the most frequent source of it, and by which we are enabled to apply a radical cure in season. M. Amussat mentioned a case of cancerous tumor of the breast, which he had just removed, and which, in the beginning, had presented all the characters assigned by M. Cruveilhier to fibrous tumors. He contests the opinion of this surgeon and that of M. Gerdy, that it is possible to establish a differential diagnosis between indurated (*dures*) tumors of the breast. The true plan, he contends, is to operate at an epoch as little distant as possible from the commencement of the disease, which is then in most of the cases circumscribed and susceptible of being totally eradicated.

M. Roux (loc. cit. pp. 212, 213,) persisted in maintaining the difficulty of diagnosticating the benign tumors of the breast, and urged with all his zeal the necessity of operating on tumors of the breast in good season; at the same time repudiating with equal energy, the opinion of M. Hervez de Chegoin, that we should defer operating for cancer to as late a period as possible. Here this interesting discussion closed. (Sitting of the Academy, March 26, 1844—*Journal des Connaissances, &c.*, Paris, May 1, 1844, p. 213.)

The animated discussion which has taken place at Paris on *fibrous tumors* in general, and especially those of the *breast*, and the difficulty of establishing their true character and diagnosing them from cancerous and other tumors, has not ceased, but promises to incite to still farther and most important investigations. The researches, in fact, made with the *microscope*, bid fair to give a still greater value to that instrument than it acquired even in the time of Lewenhoeck, or than has been accorded to it for years past, which is not surprising, when we consider the mechanical improvements which art has effected in that powerful means of interrogating the internal structure of every kind of organization. (See our note on a certain fungous growth of the testicle, *infra.*)

M. H. Lebert, of Paris, has communicated to the public (*Gaz. Méd. de Paris*, March 8, 1845, tome XIII., p. 156 et seq.,) some observations upon the results obtained by him in examining a tumor of the breast, which appear to us to possess a good deal of importance. The case which M. Lebert furnishes in illustration, was that of a

woman perfectly healthy in every respect, aged 32, in whom a tumor of the right breast had existed for ten years, but only latterly became exceedingly painful and enlarged, appearing to be a general hypertrophy of the gland, without adhesion of the teguments, or any feeling of isolated tumors in it, but somewhat painful on pressure. The pain caused by it warranted its removal by the surgeon, M. Lenoir. The microscope proved it to be a *hypertrophied portion of the mammary gland*, its general color white, and consisting of numerous globules, and these having throughout their interior smaller cellular globules, filled with a reddish fluid, which oozed out whenever the knife was applied. It had none of the characters of fibro-plastic, nor of cancerous tumors of the breast. The surrounding cellular tissue, by the long continuance of the disease, had also become so hypertrophied and thickened as to give it the appearance of a cyst. A *diagnostic point* elucidated by the microscope, and which went to show that this tumor was nothing more than *hypertrophied mammary tissue*, was the fact that it contained throughout *numerous large-sized nerves*, which afforded an explanation also of the acute pains, (not, therefore, to be confounded always with cancerous disease,) and proved its true character, for no accidental tissues of new growth contain these or other evidences of high organization. These results, moreover, confirm, as is remarked by M. A. Bérard in his recent work on tumors of the breast, the accurate knowledge which Sir Astley Cooper had of this kind of tumors. Those called *cysto-sarcoma*, as well as *fibrous* and *hydatid* tumors of the breast, all belong, M. Lebert thinks, to this species. The process of the formation of those under consideration he thinks is as follows: a portion of the mammary gland or of many of its lobes become the seat of a sanguineous afflux or local congestion, whence a more active nutrition and hypertrophy, both of this diseased gland and the surrounding normal cellulo-fibrous tissue. These lobes, as Sir A. Cooper says, become more prominent outwardly, and finally, are attached to the gland only by a mere pedicle, so as to appear sometimes quite distinctly separate from it. The *natural fibro-cellular* tissue which surrounds the mammary gland, becoming dense and hypertrophied more rapidly than the gland itself, is mistaken for a *fibrous* tumor, and when filled with an abundance of fibro-plastic, or gelatinous liquid, may have a *colloidal* (*colloide*) appearance. Or when this plastic fluid is deposited in the interstices of the fibrous tissue, it may form compartments (*loges*) which are ultimately transformed into small cysts, the globules of which may be considerably altered by imbibition. When these cysts exist in great numbers in the middle of the tumor, they take on the form of *mammary-hydatid*, which, however, must not be confounded with *serous-hydatid* tumors of the breast, or those which contain *ecchynocoques*, and which are sometimes found in the breast.

M. Lebert says, moreover, that those under consideration may acquire considerable volume; that they are more especially developed in young women; that they do not alter the general health; and especially do not contract adhesions with the skin which surrounds them, and that they leave the nipple (*mamelon*) intact: in all of which particulars it will be perceived his views differ in many points from those of M. Cruveilhier.

M. Mandl, (loc. cit., *Gaz. Méd.*, p. 157, 158,) the celebrated micrographist of Paris, who also examined the tumor in question with M. Lebert, accords with him in the existence of mammary tissue in the portions submitted by them to the microscope. Nevertheless, positive as M. Lebert's opinions appear to be on its non-cancerous character, M. Mandl asserts that he satisfied himself that *cancerous globules* were also present. He states the important fact that we must not be deceived by the *usual microscopic form* which the elementary globules of cancerous tumors are known to have; for this is sometimes not present, and he then has been enabled by other physical characters, or by chemical or other means, (which he will in due time make public,) to establish the fact that such tumors were nevertheless of genuine cancerous structure. So of *encephaloïdal* (so called) tumors of the retina, though sometimes destitute of globules of the cancerous form, he has notwithstanding found them to be unquestionably cancerous.

Mr. Liston speaks of what he calls *fibrous tumors of the mamma*, (*Lond. Lancet*, Dec. 7, 1844, p. 308, &c.) which form in the cellular tissue between the mammae, the latter becoming expanded and flattened out in front of the tumor.

But neither these nor Sir A. Cooper's *hydatid* or *cysted* tumors, the cells of which latter Mr. Liston has seen sometimes filled with a fluid as black as printer's ink, are as frequent he thinks as *carcinomatous malignant* disease of the mamma. These may occur, but rarely, in women under thirty in perfect health, with uninterrupted catamenia. Most generally they occur between the ages of forty and fifty, and sometimes later. They commence between the nipple and axilla, and sometimes in the centre of the gland, and then attack the middle of the lactiferous tubes. Sometimes the tumor remains hard and stony, with the nipple retracted, skin puckered, &c.; but usually it makes rapid progress in size, becomes soft and pulpy, or pultaceous and medullary, and throws out a fungus which may or may not bleed profusely, depending on the constitution. A section of one of these tumors, says Mr. Liston, presents a variety of diseased structure: it may be *fibrous-looking*, that is, with white bands running to the cellular tissue; or present the appearance of a gelatinous cancer, or it may be pultaceous or medullary. Sometimes all these heterogeneous or heterologous tissues are found in the same tumor; or some portions are hard and others softened down; or the vessels will give way and extravasation of blood occur.

In mere hypertrophy of the gland, support given to it with moderate compression may restore it to its normal size. Dr. N. Arnott's mode of pressure Mr. Liston thinks is very ingenious, i. e. by a sort of wooden cup or bowl, made of the size of the tumor, and into which apparatus is placed a small air-cushion, made of very fine texture. The cushion is inflated with air, so far as not to be hard; this cushion is then put in the cup and supported by a spring like that of a common truss. This will answer also, Mr. Liston says, in many cases of simple tumor of the breast.

There are, he considers, some enlargements of the mamma where the structure is altered; not a simple hypertrophy,—but where there

are masses of fibrine agglutinated together, and where the tumor will go on increasing in spite of all that can be done.

Cystic tumors cannot be dispersed by simple compression. Sir B. Brodie has described certain tumors of the breast that have yielded to lotions of spirits of camphor with liquor plumbi kept on till the surface is inflamed, then omitted and reapplied.

The knife only, says Mr. Liston, can remove the disease when the gland is altered in structure and contains a great number of cysts; but such tumors are not as he conceives malignant, and if the whole mass is extirpated there is every chance that the disease will not return. There is no contamination of the lymphatics, and the removal of the breast in those cases, may be had recourse to with great propriety.

If a patient comes, says Mr. Liston, with a small tubercle in the breast, with some puckering and adhesion to the integument, if it feels exceedingly hard and unyielding, and has all the characters of carcinoma, but is of recent origin, and you cannot trace disease to the lymphatic system, you may be sometimes justified in taking the tumor out, but *you must take the whole of the mamma with it.* When the disease is at all advanced, and there is reason to think that the constitution is affected with it, it is far better to abstain from the proceeding. At one time, adds Mr. Liston, this was the most common operation in surgery. I recollect the period when a week seldom passed over without the operation being performed two or three times in our hospitals; but now it is seldom had recourse to, and properly too, except in cases of *non-malignant* disease.

Mr. Liston has seen a case of carcinomatous tumor of the breast in a female under 30, (see his Lectures, *London Lancet*, Dec. 21, 1844, p. 359, &c.) where the skin covering both sides of the chest and all around the back was affected, hard, unyielding and extensively pervaded by tubercles, to such extent that the motions of the chest and of the upper extremities were much impeded by the indurated state of the skin.

Cancers of the mamma may at an early period be disposed to involve the lymphatics, the same as in those of the lip. Even in malignant disease, Mr. Liston has known Dr. Arnott's mode of compression, if early and well applied, to cause the tumor in great part to disappear: but in other cases it causes great suffering; for it cannot be expected to liberate the system of the constitutional taint, which will then reappear in the neighboring lymphatics and at places far removed from the disease. Thus, though the fatty matter around the mamma has been absorbed by the pressure, and the tumor lies flat on the ribs, yet the disease goes on as if nothing had been done. Dissection in such cases has shown enough cancerous degeneration.

In *cystic and fibrous* tumors however, he thinks the operation may be undertaken with a very fair prospect of success; but sometimes the disease returns, and is sure to do so if the whole of the tumor is not taken away.

*Pseudo-Cancers.*—You meet sometimes with tumors, says Mr. Liston, (*Ibid.*, p. 359, 360, &c.) which are not *described in books*, and which you will scarcely believe malignant, or that they can possibly

return. He describes one of this kind in a stout healthy woman, only a little over 30, and in whom the lymphatics were not in the slightest degree affected. There was found a great deal of fatty matter around it, and its interior to his surprise consisted of a strange soft-looking mass, containing a great deal of *coagulated blood* and a quantity of clot without the coloring matter, but there was also curious pultaceous stuff amongst it. After this he was not surprised to find that the disease in a few months returned, showing itself in three or four fungous buds in the cicatrix. There being still no affection of the lymphatics nor of the axillary gland, Mr. Liston removed these, and with them, as the patient was so stout, an immense quantity of the surrounding tissue, skin, fat and even pectoral muscle, for the tumor adhered firmly to the fascia of this last and was incorporated with its fibres. The cure was complete, and remains so now, nine years since the last operation.

In *non-malignant* tumors, Mr. Liston has sometimes cut below the mamma and left that behind, but if there is adhesion to it the whole must be sacrificed.

In *malignant tumors* when extirpated, not only the diseased mass must come out, but you must be careful, he says, to cut out also a large portion of the apparently healthy fatty tissue around it, and keep the knife also much beyond and outside of the *white bands* which you will see spreading out from the central portion of the tumor into the fatty matter. After taking out the tumor, it is to be washed and scraped, and if any indurated portions be found on its surface, you must proceed to make further excisions from the corresponding parts of the wound.

It is a good rule, he thinks, to take away *the fascia of the pectoral muscle*; as the disease frequently has some connexion with it, and will recommence in this tissue.

Mr. Liston thinks it an advantage in the dressing to apply a layer of *gold beaters' skin* to the raw surface of the wound, to prevent this adhering to the lint, which is to be placed upon this intervening tissue.

Again, Mr. Liston disapproves of closing the edges of the wound tight at first with adhesive plaster, and by making firm pressure with compresses and rollers around the chest; as this causes pain and oozing of the blood, and the formation of putrid clots, fetid discharges, &c., requiring the whole to be removed, and perhaps more vessels to be tied. He prefers merely the lint applied as mentioned above, wet for five or six hours, then one or two sutures, or more, may be required, and to terminate by bringing the edges together with *isinglass plaster*. Thus you will probably obtain union by first intention, and without discharge or pain.

The *male breast* occasionally will become affected precisely, he says, in the same way as the female, and require also removal, or it will end in internal malignant disease and death.

M. Lesauvage of Caen, (*Arch. Gén.*, Fevrier, 1844, p. 178, &c.) disapproves of the word *fibrous*, and proposes, in lieu thereof, *gelatino-fibrous*, to such tumors as are described by our author, M. Velpeau, (*Dict. de Méd.*) as formed of *solidified or vitalized* (*vivifiée*) *fibrine or albumine*. M. Lesauvage says they are to be found in those regions that are abundantly supplied with cellular tissue, and that he

has seen them in the breast, scrotum, fold of the groin, posterior part of the thigh, mesentery, &c. They are always isolated, and possess a distinct organization within themselves of numerous cysts and blood-vessels, and incommod the neighboring parts only by their size, weight and pressure. In the breast they are always developed at the posterior part of the gland, which latter, when they are very large, is flattened out and covered by them on its anterior portion. M. Lesauvage does not describe these tumors, which he has seen return after extirpation, in *seven* instances, with sufficient clearness to enable us to appreciate probably at their just value the fruits of his experience. A discussion which has elicited such profound researches, microscopic, pathological and otherwise, from the most learned surgeons and investigators of Paris, cannot properly be participated in by others, unless they come duly armed with accurate and new facts.

M. S. Tanchou in a more recent work of his, (*Recherches sur le traitement médical des tumeurs cancéreuses du sein*, Paris, 1844,) boldly reassumes the prevailing popular doctrine of *conservativeism* and the substitution of *medical* treatment even in that most formidable of all surgical diseases, cancer. He maintains that by a proper medication the most clearly established and unequivocal forms of cancerous tumors of the breast, may be effectually arrested in the economy, and in their local devastation. He strongly censures the frequent resort to extirpation, where not necessary, and for alleged cancerous tumors that are not in reality cancerous. From a comparative table of deaths by cancer, at Paris and its environs, between 1830 and 1840, but from which no doubt there must be a great deduction made for errors in the true designation of this disease, as is justly remarked by the editors of the *Archives Générales*, (4<sup>e</sup> serie, t. VII., April, 1845, p. 523,) M. Tanchou asserts that this disease has increased in frequency from 1.96 in a 100 in 1830, to 2.40 in a 100 in 1840. But according to a more important table by Professor Rigoni Stern of Padua, (*Arch. Gén.*, loc. cit., p. 524,) embracing an interval of 80 years, viz., from 1760 to 1839, the same increase of mortality from cancer has taken place at the last mentioned city; viz., from 48 in 1000 between 1760 and 1769, it rose to 93 in a 1000 from 1830 to 1839; but this increase was exclusively confined to cancers of the *uterus*. Whereas, M. Tanchou states the augmentation in Paris to have taken place in all the most important organs and in proportion respectively to their greater degree of excitability or impressionability, and this in their physiological order. He however also admits that the increase has occurred to a greater extent in women. M. Tanchou imputes this increase of the disease to the effects of civilization, and in support of this, instances the less degree of frequency of deaths by cancer in the environs of Paris than in the capital itself: an error in the tables which, as is again justly remarked by the editors of the *Archives Générales*, (ib. loc. cit., p. 524,) is to be ascribed to the fact that the poorer class of patients in the suburbs most usually come for relief to the hospitals within the city proper.

*Fungus Hæmatodes occupying the entire bladder.*—Dr. E. Bisell, of Norwalk, Connecticut, (*American Journ. of the Med. Sciences*, new series, vol. VII., p. 122-124, Philad. 1844,) relates one

of the most extraordinary cases of isolated and sudden formation of malignant disease of the bleeding fungoid description on record. In the short space of one year, a man aged 67, who was of temperate habits and up to April, 1842, had enjoyed uninterrupted health and a sound constitution, was seized with irritation in the bladder and constant desire to urinate, followed by discharge of large quantities of blood, and distressing pain and exhaustion, which finally ended in death. The surgeon, previous to this event, diagnosed through the rectum and above the pubis, an enormous tumor occupying the whole bladder, and thus dispelled the illusion of gravel and stone, for which supposed diseases he had been for some time under treatment by an empiric. On examining the body, the diagnosis was fully confirmed. The tumor was ovate, and nine inches from above downwards, and about four and a half inches transversely. Its greatest diameter was naturally towards the abdomen and perineum, from meeting with less resistance in those directions. It was a true fungus haematoëdes, and originated near the neck of the bladder posteriorly. Its texture could be torn by the finger without much difficulty. The bladder was so completely filled up by it that there was not room for the smallest quantity of urine. The most remarkable feature is, that there was not a vestige of disease in the kidneys or other viscera any where!

A congenital *encephaloïdal* tumor, or *encephalocele*, of an extraordinary character, proving on dissection to be a true *hernia cerebri*, has been recently described by Mr. W. Lyon of Glasgow, (*Lon. and Edin. Month. Journ. of Med. Science*, by J. R. Cormack, M. D., &c., Nov., 1844, p. 983; and the *London Medical Gazette*, July 12, 1844.) The child, aged nearly one month, at the time of the description of the case, exhibited an oblong tumor, chiefly over the occiput, and extending from the vertex to the nape, 11 inches in circumference, 9 in length, and 7 in its lateral dimensions, partially livid or marbled in color, fluctuating and *without pulsation*; traversed anteriorly by small tortuous vessels, and the parts not livid covered with thin soft hairs. No opening could be felt under its attachment to the scalp—the head was normal, but the forehead remarkably low, and receding—the child well formed, but weakly. The tumor being without pulsation and nearly as large as the head, and the cranium of normal size, were circumstances that *masked* its true character and led to the inference that it could not be connected with the brain or composed of cerebral matter. This opinion was strengthened by the fact that the fontanelles remained flaccid and could not be made tense by pressing on the tumor, as if to effect its retrocession by a hernial taxis. Gentle compression was tried, but soon abandoned. Finally, the edge of an opening into the cranium could be felt. The child lived just a month, and the tumor, on dissection, was found to contain 3 oz. of bloody serum, and its parietes to be formed of the scalp, pericranium and dura mater. Portions of the posterior lobes of the cerebrum, about the size of a small apple, covered by the arachnoid and pia mater, having a film of serum between them and the dura mater, projected through an opening in the inferior and middle part of the occipital bone into the sac, being of the size of the point of a finger, with rounded edges, and situated immediately above the *tentorium*, which was imperfect. It was bounded above by the termi-

nation of the longitudinal sinus, at the sides by the lateral sinuses, and below by the incomplete tentorium. The portion of brain in the tumor was compressed where it passed through this abnormal foramen, and bulged out to the size of a small apple in the interior of the sac. There was no fluid within the cranium, either beneath the membranes or in the ventricles. The substance of the brain was quite normal. The impacted state of the parts about the occipital opening, no doubt prevented pulsation from being felt externally.

Cases of this description, though possibly beyond the reach of surgical aid, are rendered exceedingly valuable by the difficulties and delusions with which a post-mortem may show the diagnosis to have been necessarily embarrassed.

Even the *brain* itself is not exempt from the formation of *scirrhou*s tumors within its substance. A remarkable case of this kind is related by M. Frestel, (*Gaz. Méd.*, de Paris, April 19, 1845, p. 253,) of an infantry soldier of young and robust constitution, who was received into the hospital of Saint-Lô, and who, after months of acute suffering from pain in the occipital region, but what is unaccountable, without, so to speak, any fever, or the least deviation of any of the mental or physical functions from their normal state, except perhaps a slight defect at times in the articulation of words, ultimately died suddenly without convulsions. The organs of the different cavities and the cerebrum itself was also found normal, except that there was a considerable quantity of serosity in its ventricles; but on examining the cerebellum, its entire left portion was found disorganized, increased in volume, and having small but well-marked mammillary eminences on its superior surface. The inferior and posterior part contained a tumor of the size of a large nut, supported on a distinct pedicle. The right portion of the cerebellum was in a measure healthy. The tumor was hard and resisting to the touch, and of a tallowy (*lardacé*) aspect, and when cut into exhibited the characters ascribed by authors to scirrhou tissue. T.]

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## CHAPTER XI.

### TUMORS OF THE BONES (EXOSTOSES).

Under the title of tumors of the *bones*, my intention here is to speak only of the class of tumors designated by the name of exostosis. Surgical remedies are not applicable to all the varieties of exostosis. So long as the malady is still the seat of an inflammatory process, and that it presents the slightest character of osteitis, acute or sub-acute, there would be danger in attacking it with instruments, and the operation would be absolutely without any result. It is its cause that we must extinguish, and not the exostosis, which we have to treat. In the acute state or in a state purely chronic, exostoses, developed under the influence of syphilis, or any other general infection, are equally repugnant to every kind of surgical operation, so long as the

germ has not been completely destroyed in the system. Should the exostosis be complicated with caries, necrosis, tubercular, sarcomatous or other degenerescence, it is still to these last affections that we must address ourselves, and not to the exostosis, properly so called. Finally, operative surgery ought moreover to exclude from its domain diffused, large or fusiform exostoses, and those which comprise the whole circumference of cylindrical bones, or the entire thickness of the large bones to a great extent. I will add, that limited exostosis, more or less completely pediculated, ancient and indolent, which is almost the only kind that ought to be attacked, would not of itself justify serious operations, unless by its situation or volume, it should in reality cause a great disturbance in the exercise of some of the functions, or unless it should trouble in too serious a manner the regularity of the features and forms of the part. Exostoses being very common, have naturally very early attracted the attention of surgeons. Heliodorus (Peyrilhe, *Hist. de la Chir.*, p. 391, 392,) who seems to have been acquainted with eburnoid exostosis (*l'exostose éburnée*), positively recommends their removal. The ancient Greeks, who often employed the hot iron in place of the cutting instrument in such cases, also made use of both these means at the same time. J. L. Petit (*Œuvres Posthumes*, t. II., p. 27,) who adopted the same method, adds that exostoses which have not been dissolved neither by mercury or other internal remedies, ought to be destroyed by means of the exfoliating trephine, chisel and mallet, (*Maladies des Os.*) About the same epoch Duverney (*Maladies des Os.*, t. II., p. 500,) a rival of J. L. Petit, laid down the following principles: if the exostosis has not a large base, it is to be removed, he says, by means of the rasp, chisel or saw; when the exostosis, on the contrary, is large, we ought to give the preference to the exfoliating or ordinary trephine, taking care to place the crowns by the side of each other, in order afterwards to drive out and to remove by means of the strokes of the chisel the bridges that remain between them. The red hot iron and caustics found, at the beginning of the 18th century, a decided antagonist in Kulm (*De Exostosi*, etc., 1732; *Thèse de Haller*, t. V., p. 653.) Extirpation with the knife, says the author, is the only remedy for exostoses, all other means being doubtful and uncertain. Lecat, wishing to reconcile the various ancient modes of practice, recommended in 1755, under the anonym of Labissierè, (*Prix de l'Acad. de Chir.*, t. VII., p. 157, in-12,) the excision of exostoses which have a tendency to imposthumate or which are limited to the interruption of certain functions; the hot iron against those which are complicated with fungosities and deep-seated caries; delay for those which no longer make any progress and which do not cause any accident. This doctrine did not prevent Allan (*De Exostosi*, § 12; *Thèse*, 1770) from proposing the removal of exostoses in two stages. Having incised the integuments, scraped the periosteum, and dressed the wound dry, Allan recommends that we should, on the following day, apply a sufficient number of the crowns of the trephine; that we should then, by means of the gouge and mallet, drive out the osseous bridges, and terminate by rasping the bone which sustained the exostosis. It is readily conceived that this method could neither be

agreeable to the taste of the patient or the surgeon, and that Nicolas (*Dict. de Chir. et de Méd. et de Vétér.*, t. I., p. 521, 522,) who simply recommended to saw through the base of the exostosis, when it is narrow, found more sympathy among practitioners. Since then an attempt has been made to systematize these different modes.

B. Bell (*Cours de Chir.*, t. V., p. 314,) and Maune (*Maladies des Os*, p. 19-33-35) after him, have established, that an exostosis ought to be attacked with the trephine, if it can be included in the crown of the instrument, and with the ordinary saw when it is too large—When the exostosis surrounds the whole circumference of the bone, we must, say these authors, exsect or amputate the part, whether it exists in the small bones of the feet and hands, or even when it is situated in the thigh, leg, or arm. Petit-Radel (*Encyclop. Method.*, partie Chirurgicale) in such cases also recommends to exsect the cylinder of the bone, rather than confine ourselves to the excision of the exostosis. Surgeons, nevertheless, have pursued a more simple practice. With Voigt (*Plouquet, Suppl.*, p. 53, col. 3,) the extirpation of an exostosis succeeded very well and enabled him to preserve the continuity of the part. M. A. Cooper (*Oeuvres Chirurg.*, translation of Bertrand, t. I., p. 306) recommends removing them with a saw, and says that the operation, which under such circumstances is accompanied only with a slight pain, does not in general involve any danger when it has been well done.

The ligature mentioned by Klein (*Sprengel, Hist. de la Méd.*, t. VIII., p. 341,) does not in reality deserve a refutation, since it appears so entirely foreign to the treatment of exostoses. In conclusion, it is not, in fact, allowable to undertake the removal of these tumors, unless it should appear practicable to reduce them by means of the saw, or to destroy them by the chisel or the trephine. By means of the cultellaire saws, the chain and rowel saws, and the improved osteotomes, which science possesses at the present time, there is scarcely an exostosis, with a strangulated or pediculated base, which cannot be readily extirpated. The operative process being simple or complicated, much less from the nature or form of the exostosis, than from the anatomical arrangement of the organs which surround or sustain it, cannot be well understood except when treating of exostoses in particular. It is, moreover, evident that certain of these tumors, those especially which are superficial and perfectly pediculated, are generally easily removed. An empiric (*Guérin, Essai de Méd.*, t. II., p. 276, an VI.) supposing that he was about to lay bare a lipoma, having perceived his error and recognizing before him an enormous exostosis, isolated it down to the level of the sound bone, and succeeded in detaching it by means of a common carpenter's saw: the patient got well

#### ARTICLE I.—EXOSTOSSES OF THE TRUNK.

##### § I.

On the cranium, the extirpation of exostoses has not always been unattended with inconveniences; it is moreover easily performed. Having laid bare their root by means of suitable incisions, nothing

prevents our dividing them either by the ordinary saw, the hand-saw, or the trephine. Nevertheless, I would recommend that on this part of the body we should not have recourse to the gouge and mallet, unless it were necessary, and that in order to avoid all cerebral concussion, we should confine ourselves to the employment of the different kinds of saws which I have just spoken of. Arnaud, (*Mercurie de France*, Janvier, 1716,) speaks of an exostosis four inches long and two in breadth, which was situated on the top of the head of a domestic, and which was first attacked with a trephine. Perceiving that the tumor was osseous throughout its whole substance, the surgeons deferred the operation until the next day. Serious accidents which came on in the night, obliged further postponement, and the patient succumbed at the expiration of three days, without the autopsy throwing any light on the cause of so sudden a death. We also find in Sauvages (*Nosologie*, t. VI., p. 235,) the history of a patient who had in the auditory passage a tumor that was taken for a foreign body, but proved an exostosis, which was attempted to be extracted, but soon caused death. M. A. Cooper, (*Œuvr.*, trans. of Bertrand, t. I., p. 310,) cites a case of fungous exostosis of considerable size, which occupied the two tables of the frontal bone, and which was excised, but in such a manner that the person operated upon died on the sixth day. We must not, therefore, undertake the ablation of exostoses of the cranium without necessity, nor resort to this grave remedy unless the tumor has excoriated and ulcerated the tissues, and that it is entirely external or threatened with some degenerescense.

## § II.

The *bones of the face* have still more, perhaps, than the bones of the cranium been the seat of exostoses, and for which serious operations have been fearlessly undertaken. It is to be remarked, in fact, that in this region surgeons have obtained numerous successful results. Brutner (Koenigsberg, 1775, observ. premiere) speaks of a patient who, in consequence of a fall when six years of age, had on the jaw an exostosis which was extirpated eleven years afterwards, and which then weighed six ounces. Reisinger, (*Bull. de Féruccac*, t. XI., p. 361,) states that he successfully removed from the upper jaw, an exostosis of certain volume by means of Thæter's saw, when all other processes had failed. Should the exostosis occupy the lower jaw, it must be destroyed in the same manner. Jourdain, (*Maladies de la Bouche*, t. II., p. 123,) in order to remove one which was situated on the outside of the jaw, incised and dissected the gum around it, to detach it by means of a flat slightly curved chisel with a sharp edge. The actual cautery was afterwards found necessary, to destroy a purulent exudation from the traumatic surface, and the patient recovered in 34 days. This method, recommended by Blicke, has been favorably received by M. A. Cooper, who, in a case analogous to that of Jourdain, detached the exostosis by means of the bistoury, and afterwards deemed it necessary to apply the cautery to the bottom of the wound. Other cases of exostoses of the jaws destroyed by the instrument or by the hot iron, have also been reported by Harrison,

(Sprengel, t. VIII., p. 366, 1832,) Mosque, (*Ancien Jour. de Méd.*, t. LXXI., p. 506,) and Verduin, (*Thèses de Haller*, t. V., p. 69.) One of the most curious examples of exostosis of the face, successfully removed, is that related by Vigarous (*Opuscules sur la régénération des Os*, p. 170.) The tumor occupied the vault of the palate, and extended from the neighborhood of the anterior palatine foramen, as far nearly as the uvula. Its largest diameter was ten lines. The surgeon having assured himself that it was only soldered as it were against the bones, attempted to detach it without penetrating into the nasal fossæ. There remained around the cavity where it was situated an osseous border, which afterwards came away in fragments, and did not prevent the cure from being accomplished in the space of a month. Should the exostosis be situated in the vicinity of one of the alveolar borders, the cutting pliers, which I mentioned under the article of *exsection of the jaws*, would render its excision one of the easiest things imaginable; Liston's scissors would be equally applicable to it, should it be dilated, while presenting at the same time a root that was slender and of sufficient length. Wounds of the face, moreover, reunite with so much facility that incisions should not be spared in this region, should it appear that they would render the destruction of the exostosis more easy and more certain.

### § III.

In exostosis of the *sternum*, I have met with but one instance in which its form and character would admit of extirpation. The tumor was of the size of a pullet's egg, and its root one-half less in diameter than in its dilated portion. It was laid bare by two curved incisions, which detached an ellipse of the skin in front; its section was afterwards made by means of two cuts of the crested saw, directed first from right to left, then from left to right, and as near as possible to the anterior plane of the bone. The borders of the wound were then gently brought together and the operation was unattended with any serious consequences.

### § IV.

I have also, in two instances, met with exostoses on the apex of the *spinous processes* of the vertebral column, and which I might have extirpated, in one case, on a level with the projecting vertebra, and in the other, in the lumbar region. But nothing was done to remedy this deformity.

### § V.

The *bones of the pelvis* sufficiently often present these kinds of exostoses. A patient had one of very large size on the pubes, which caused him a good deal of suffering. M. A. Cooper (*Œuvr.*, transl. of Bertrand, t. I., p. 320,) effected its removal, using Machel's saw to begin with, and finishing with that of Hey. The cure was completed in a month. I have met with a young man who had on the outside of the spine of the ilium, on the left side, an exostosis a half an inch in thickness, half a foot long, and near twenty lines in breadth, which was situated transversely, and caused, moreover, no

pain, and had, according to the patient, been developed in less than two years. The young man was not willing to submit to any operation for his relief. I have met with exostoses in the same situation in three other persons; but in these cases they were of such inconsiderable size that I have not thought it necessary to recur to surgical means. Exostoses in the interior of the pelvis, are among the most frequent that we meet with, the proof of which I have given elsewhere, (*Traité d'accouchements, Vices de conformation, Accouchements contre nature, etc., 2d edition;*) but as they are beyond the reach of operative surgery, it is useless at this time to examine them.

Plessman, who asserts that he destroyed one on the anterior surface of the sacrum, by means of the actual cautery, has not been relied upon by any one, and has left it to be inferred, that the tumor he refers to, was one of an altogether different description.

## ARTICLE II.—THE HAND.

### § I.—*Hand.*

In the limbs especially, exostoses require all the attention of the surgeon. Covillard (*Obs. iatro Chirurg.*, p. 97, obs. 36, 1739,) extirpated one under the name of a wen, (loupe,) of a cellular texture, of the size of a pullet's egg, and transparent as a crystal, and which extended from the phalangeal articulation of the little finger to the middle of the hand. The incision of the soft parts having been effected, Covillard made use of a shoemaker's knife to complete the operation, and his patient recovered. An exostosis of considerable size, which was situated upon the same finger, and which incommodeed only by its size, was also at a later period successfully removed by Bidloo (*Exercit. Anat. Chir. 9, De Exostosis.*) It must be that these exostoses of the little finger are quite common, for M. Champion, also, gives two examples of them: in the first case (communicated by the author) a bosselated transparent tumor, of the size of a goose's egg, was situated upon the inner side of the first phalanx of this finger. Having operated in the manner I have described in speaking of exostosis of the sternum, the surgeon made use of a solid scalpel to force out (*faire sauter*) the exostosis, and afterwards had recourse to the gouge, to remove everything from the phalanx, that had the appearance of being expanded (*rarefié*), fungous (*carnifié*), or diseased. In the second case (*Thèse No. 11, Paris, 1815, p. 61*; obs. 10) the tumor was situated upon the outer side of the forefinger, towards the middle of the first phalanx. It was of the size of a nut, and other practitioners had proposed to destroy it by amputating the finger. An osseous tumor of three inches and a half circumference, developed itself upon the second phalanx of the forefinger; Vigarous (*Oeuvr. Chir.*, p. 458,) made an incision, which included the entire base of the exostosis, and enabled him to detach it in two successive stages, by means of a fine saw, by removing half the corresponding metacarpal bone, and then the forefinger itself. The same practitioner, also, had to remove from the outer side of the right middle finger, what he called an osseous loupe, and which kept the two fingers six inches apart. This tumor, which was seven or eight times

larger than the bone which sustained it, and which formed a kind of shell to it, was filled with matter resembling tallow or honey. Vigarous (*Opusc. sur la Régén., &c.*, p. 172,) removed the first phalanx of the diseased finger, together with the second bone of the metacarpus, and cured his patient in the space of six weeks. M. A. Cooper, also, speaks of an exostosis which occupied the second phalanx of one of the fingers. The first ablation was followed by a return, but the second effected a radical cure. In another case, Vigarous encountered an osseous *loupe\** on the first bone of the metacarpus. This tumor, which was thirteen inches and a half in circumference, at its dilated portion, and nine inches at its root, appeared to have been developed at the expense of the second and third bones of the metacarpus, as well as of the first.

### § II.

I have seen exostoses on the *fore-arm*, which were in some instances globular, and at other times *styloidal*. But the patients experienced so little inconvenience from them, that they never thought of having them removed.

### § III.

The *humerus* occasionally presents on its outer side and near the shoulder, an osseous tumor, the extirpation of which has already been several times attempted. The first example of the kind which has been spoken of among us, belongs to Ant. Dubois. I have heard this surgeon relate that the exostosis, which was concealed underneath the deltoid muscle, was situated nearly two inches below the articulation; that it was of the size of a large pullet's egg, and that it became necessary to cut through the muscular fibres, in order to lay it bare, after which he made use of the ordinary saw, gouge and mallet to complete its extirpation. In another case which I have seen, the tumor was situated precisely in the same region, and presented nearly the same volume. M. Roux, who performed the operation, being desirous of saving the deltoid muscle, made a long incision on each side of it, so as to leave a kind of musculo-cutaneous bridge between them. The blade of a common saw, detached and passed under this bridge, and afterwards re-inserted into its handle, served to make the section below the pedicle of the tumor. As this saw could not be worked in a direction parallel with the axis of the humerus, it was necessary to make use of it a second time, and then to have recourse to a sort of file to equalize the surface of the bone. An abundant suppuration and accidents of quite a grave character supervened, but the cure ultimately was completely established. At the present time we should have to choose between three processes: One would consist in laying bare the tumor by cutting a large triangular or V flap, which should be raised up upon its base. After having applied pieces of pasteboard or linen to protect and depress the borders of the wound, the exostosis could be readily extirpated

\* The word *loupe* literally and anciently means a *wen*; and afterwards it became synonymous with *lipoma*, from whence it is probably derived. (See on Lipomatous Tumors, supra.) Its use in the case mentioned here and farther back, shows that it was applied to the reverse of wens and fatty tumors, viz., to those of an osseous, and also transparent texture. T.

by means of the ordinary saw, which it would be more advisable to work from below upwards than from above downwards. By a second process we might confine ourselves to cutting down upon the tumor itself, through the whole thickness of the tissues, from the apex of the acromion to the point of the deltoid, and then push back the lips of the wound to the right and to the left, to enable us to apply the saw upon the pedicle of the exostosis; but this process would not be applicable but to exostoses which make a very considerable projection, and which are elongated and have a narrow pedicle. The third, which is no other than the process of M. Jeffray, for the exsection of the elbow, and which M. Roux has proposed to put in practice, should at the present time be performed in the following manner: the two lateral incisions being made, we should carefully isolate the bridge and soft parts from the contour of the tumor. The cultellaire saw or one of the other hand-saws somewhat narrow, or even the osteotome of M. Charrière, would readily divide, either from one side to the other or from above downwards, the pedicle of the exostosis. No doubt also the articulated saw would answer the purpose equally well. All that would now remain, would be to thrust out and extract the foreign body through one of the openings destined for the passage of the instrument. But at the present day when we know how harmless is the division of muscular fibres, who would expose himself to the difficulties of this process, when that which I have pointed out above, renders the operation so easy and so simple? Exostoses are sometimes found also upon the shoulder. I have already mentioned, in speaking of exsection, or extirpation of the clavicle, that the history of a tumor of this kind which had two feet in circumference, and which weighed five pounds, and was a foot in length, had been given by Kulm. The tumor was removed, without, however, his mentioning very clearly whether the clavicle had to come away along with it at the same time.

#### § IV.

Lobstein (*Compte-Rendu du Musée de Strasbourg*, 1834, p. 64, no. 79,) says that an exostosis which was situated upon the scapula of a young man, was extirpated, and that the cure was effected in two months and a half. A child thirteen years of age, had upon the lower angle of the right shoulder blade, an exostosis of the size of a large egg, one half of which projected outwardly, and the other inwardly. The surgeon, M. W. Beaumont, (*Gaz. Méd.*, 1838, p. 778,) by excising with the saw or Liston's cutting pliers the angle of the scapula, which he caused to project between the latissimus dorsi and serratus magnus muscles, while raising up the arm of the patient, in this manner removed the tumor, and succeeded in obtaining a perfect cure.

#### § V.—*The Foot.*

Exostoses of the feet are met with especially upon the phalanges of the toes. André (*Observations sur les Maladies de l'Urét.*, p. 410,) speaks of an exostosis of the size of a large cherry, which was situated upon the *great toe*, and which he was unable to remove until after having cauterized it several times with *eau mercurielle*.

Having elsewhere spoken (see Vol. I.) of sub-ungueal exostoses of the different toes, described in a particular manner by Dupuytren and M. Liston, (*Bull. de Féruccac*, t. XIV., p. 255,) who with myself prefer in such cases amputation of the last phalanx to excision of the exostoses, I will refer the reader to those remarks. There have been met with on some of the bones of the metatarsus, exostoses which require a little further attention. It was in an instance of this kind that B. Bell (tome V., pp. 314, 315,) decided on extirpating completely one of these bones for an exostosis, which occupied its entire circumference. M. Herpin (*Constitution Médicale d' Indre-et-Loire*, p. 15, 1er trim. 1818,) speaks of an exostosis of three inches in circumference, which was situated upon the *first bone of the metatarsus*, and which he removed in the spring of 1806, by means of a small saw, after having laid bare its root by an elliptical incision. The bottom of the wound was cauterized with red hot iron, and the patient radically cured. There is frequently found upon the dorsal surface of the great toe, near its anterior extremity, a conical shaped exostosis, which it may become advisable to extirpate. A straight incision and one cut with the pliers, are generally all that is required for it. As, however, there is a mucous bursa there, which is sometimes continuous with the neighboring joint, it is advisable not to operate there without some degree of caution.

### § VI.

In the leg, exostoses are found upon the fibula, tibia, and patella. M. A. Cooper relates that he saw a cartilaginous exostosis of the size of a chesnut, underneath the periosteum, an inch and a half below the head of the fibula. The extirpation of this tumor was performed by M. Leving, (A. Cooper, *Œuvr. Chir.*, transl. of Bertrand, t. I., p. 519,) who had recourse to the crucial incision, and divided the fibular nerve before removing the tumor with Hey's saw. The cure was effected in a month. A patient operated upon by V. Moreau, (communicated by M. Champion, who witnessed the fact,) was less fortunate. In a peasant girl, there was an exostosis of an eburnoid character (*de nature éburnée*) and large base, situated upon the antero-external side of the body of the tibia. This tumor was laid bare by means of a quadrilateral flap, and then removed by the aid of the gouge, chisel and mallet. This was in 1794; accidents supervened, and the patient died. In another case, a boy of fifteen or sixteen years of age, the exostosis, which was seated upon the spine of the tibia, had acquired the size of a Saint-Jean pear. The dissection of a triangular flap allowed of rasping the bone and embracing the exostosis in the aperture of a piece of tin plate, and thus excising it, without injuring the soft parts. The wound was united by first intention, and the cure, according to Bourqueneau, (*Annal. de la Soc. de Med. Prat. de Montpellier*, t. VII., p. 424,) was completed in the space of fifteen days. Finally, M. A. Cooper gives a case of exostosis with narrow base, situated underneath the periosteum at the antero-superior part of the tibia, and which, after having made an elliptical incision in the soft parts, was successfully removed by means of an amputating saw, directed from above downwards, and then from below upwards. A slight exfo-

liation, which took place subsequently, did not prevent a radical cure from being accomplished.

### § VII.—*The Patella.*

Vigarous, (*Œuvr. Chir. Prat.*, obs. 112, p. 557,) who has gathered in his work so many extraordinary observations, speaks of an exostosis or osseous steatoma, which grew on the anterior surface of the patella, and which was 25 inches in its circumference and was covered with four ulcers. Amputation of the thigh had been proposed, but Vigarous undertook to remove the tumor without interfering with the articulation. He effected this by means of several incisions and by sundry cuts of the saw. Some osseous laminæ exfoliated at a later period, but the operation, which consumed only fifteen minutes, was followed by complete success. As for the rest, it would appear from the description which this author gives of it, that this tumor, which was filled with soft matter, and osseous only upon its exterior, belonged rather to the class of degenerated hematic tumors than to that of exostoses properly so called.

### § VIII.

The *lower third of the femur* is perhaps the region of the osseous system where pediculated exostoses acquire the greatest volume, and are most frequently met with. I have seen them sometimes on the inner and sometimes on the outer condyle of this bone, and near the ham, and either acuminate or globular, and of the dimensions of half an inch to an inch in height. Those which more particularly require the attention of the surgeon, are such as have a tendency to develop themselves above the inner condyle, sometimes in front and sometimes behind. This is a kind of exostosis which is scarcely mentioned in authors, and which has this remarkable character, that the tumor is almost always found with the same features, and in the same place. M. A. Cooper, (*Œuvr. Chir.*, transl. of Bertrand, t. I., or translation of Chassaignac, p. 608,) who relates two examples, says, that in one of his patients the exostosis, which he denominates cartilaginous, was situated underneath the periosteum, a little above the inner condyle of the femur, and that it occasioned quite a considerable degree of pain. The exsection was made without implicating the muscles, by means of a saw which it was found necessary to fix by hooks, requiring afterwards the removal of some osseous asperities by means of cutting pincers. In the other case, the tumor, which was situated in the same place, and occasioned some inconvenience in the movements, was laid bare by an incision, which had to include some fibres of the sartorius muscle, through which the exostosis was extracted after Machel's saw, directed by the inventor himself, had divided its neck. I have already met, in six or seven instances, with the species of exostosis I have just described. In the first case it seemed as if the tuberosity of the inner condyle had been transformed into a long and strong coronoid process. The patient, who had been in this state for fifteen years, had become so habituated to it, that he would not hear anything said on the subject of an operation for his relief.

In the second case the tumor existed in a young man accustomed

to make voyages. It had the form and size of a small melon, and was situated underneath the vastus internus muscle, two or three inches above the articulation. The idea of an operation, and the apprehension of danger, have hitherto deterred the patient, who, however, suffers from it in no respect whatever.

The third case is that of a servant, seventeen years of age, who came in April, 1835, to the public consultation of the hospital of La Charité. The exostosis in him was precisely similar to that of the preceding patient, both in situation, form and volume.

In a fourth example, which I saw in 1836, the patient was forty-five years of age, and could not indicate the origin of his exostosis, which was also situated upon the inner side of the femur, at some inches above the knee.

It was in November, 1838, that I met with the fifth case. This last case was a man of about sixty years of age, who states that he has had it about thirty years, and that he attributes it to a badly-treated fracture of the thigh. There is every reason to believe, however, that there is nothing very authentic in this history. The abdominal limb in fact has no shortening, and the bone, in other respects, is perfectly regular. The tumor, which projects two inches and a half on the inside of the femur, which is three inches in diameter at its largest part, quite strongly bosselated, and situated at the union of the middle with the lower third of the thigh, exhibits at its root a contraction (*étranglement*) sufficiently marked to forbid the idea of imputing it to a morbid (*vicieux*) callus. A young boy, twelve years of age, had one of the size of a pullet's egg, a little lower down, which gave him no trouble, and for which he did nothing. The same was the case in a patient whom M. Macgloghlin took me to see in 1837.

It is a matter of surprise that we should so often meet with tumors of this description in such a region. None of the patients I saw were in any other respect annoyed except by the size, weight or deformity of the tumor. Thus there were no sufferings, no lancinating pains, no excoriations nor inflammations, nor adhesions of the skin or other tissues. So also did these patients, when I pointed out to them some of the dangers they might incur in undergoing an operation, come to the determination to retain their infirmity, and recoil from the operation, and perhaps they acted wisely. Ought we, however, on that account to say that supra-condyloid exostosis of the femur is absolutely incurable? No, certainly; but to remove it we have to resort to an operation, sometimes difficult, and almost always dangerous, whilst the disease in itself does not usually compromise the functions of the limb or the general health of the individual, and may remain stationary for an indefinite number of years, when it has once arrived at a certain period of its growth. The conclusion, therefore, in my own mind is, that I would not decide upon the removal of tumors of this description, unless, notwithstanding my representations, the patients should find themselves so much incommoded or annoyed as to make an urgent demand for relief, or unless such tumors should threaten to acquire too large a volume, or to undergo degeneration, or cause, in fine, actual pain, or serious functional derangement in the part. As for the rest, there is no other treatment for them but excision or extirpation, in which event many processes may be employed. Should

the exostosis be flattened and of small diameter, we lay it bare by means of a simple incision, commenced above and terminating below, and which ought to penetrate down to the bone. The cutting pliers, Liston's scissors, or one of the exsection saws, will then suffice for excising it from the femur. When it does not appear practicable to isolate the whole contour of the tumor by means of a straight incision, we may then choose between the crucial incision, that of the T, the double vertical incision of Jeffray, or the semilunar. The crucial incision would have no other inconvenience than that of completely dividing, and in two opposite directions, all the fibres of the vastus internus muscle. Nevertheless this difficulty ought not, at the present day, to deter us, if by that means we should render the operation more easy, inasmuch as the section of the muscular layers involves in reality but very slight inconvenience. The T incision might be made in such manner that its horizontal branch could be placed in front or behind the tumor, almost indifferently. I should, however, prefer to place it in front, in order that its vertical branch might be made to fall upon the inner border of the ham, and permit the two flaps which it circumscribed to be reversed, the one downwards and the other upwards and backwards. The incision with two parallel branches, one situated in front and the other behind, so as to circumscribe a bridge of soft parts upon the exostosis, has in this region still greater inconveniences than for sub-deltoidal tumors of the humerus. M. Roux, who made trial of it in the young servant whom I have mentioned farther back, was obliged to divide the soft parts transversely through their middle, transforming it in this manner into two quadrangular flaps. Besides creating in this manner embarrassment in the section of the tumor, we expose ourselves moreover to the risk of not being able afterwards to disengage it from among the muscles, and effect its complete extraction. It is therefore more prudent to resort at first to the semilunar incision. This incision, whose free border should be turned inwards, would circumscribe a flap, which should be reversed from behind forwards, and would lay bare the whole of the exostosis. An assistant drawing this flap upon its base and outwards, while another assistant would hold apart the inner lip of the wound backwards and inwards, and while the limb was held in semi-flexion, and lying on its outer side, would enable the surgeon to carry any saw whatever very near the femur, and to divide the neck of the exostosis. If there should remain any asperities or osseous inequalities at the bottom of the wound, nothing would be more easy than to remove them by means of the chisel, gouge and mallet, or by the aid of the rasp or the concave rowel saw of M. Martin. We might also confine ourselves to a straight incision, placed on one of the sides of the tumor, and which should be sufficiently long to enable us to separate its borders wide apart. The osteotome of M. Heine, or the saw of M. Charrière, or even that of Aitken, introduced by this means upon the pedicle of the tumor, would evidently enable us to detach it in the greater number of patients; and everything shows that by giving the incision a certain extent, it would give free egress to the foreign body. It is perceived, moreover, that the process in these cases ought to vary according to the size, form and actual seat of the tumor, or the particular taste and practice of the

surgeon. I would only remark, however, that in general the semi-lunar incision is the one that should be adopted by preference. Up to the present time, this operation has not been performed sufficiently often to enable us to appreciate exactly either its dangers or harmlessness. The two patients of M. A. Cooper, did not recover without causing some uneasiness; and that of M. Roux, who, though he was young, of excellent constitution, and in perfect health, ultimately perished. The surgeon, being obliged to penetrate down to the bone, necessarily arrives beneath the fascia lata. Being unable to detach the exostosis without more or less contusing the neighboring tissues, and without making a wound whose bottom is hard and more or less rugated, he can scarcely count on immediate reunion. But if the inflammation and suppuration, which in such cases would almost inevitably supervene, should take on a diffused character and extend downwards towards the ham, and upwards into the body of the thigh, they would soon constitute one of those forms of phlegmonous erysipelas, or diffused phlegmons, which are the most formidable that can be imagined. I would therefore lay it down as a precept, whenever immediate reunion, and without suppuration, cannot succeed, that we should not attempt the cure of the wound by first intention, but confine ourselves to keeping it slightly open by means of small balls of lint, until it is perfectly cleansed, and that there has been formed the pyogenic membrane and cellulo-vascular vermillion surface.

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## CHAPTER XII.

### THE LIGATURE IN MASS.

We have already seen in the preceding volumes under how many forms the ligature is employed in surgery. Useful for uniting certain wounds, almost indispensable around vessels, to arrest the blood in amputations, for wounds of arteries, aneurisms, and most bloody operations, it is, so to speak, called for as often as we take the bistoury in our hands. But in such cases the ligature includes and constricts only the vascular canal, whose orifice or calibre we wish to close. But there are a class of operations in which we apply the ligature in a different way. In these we no longer apply it on a distinct vessel at the bottom of any wound, nor is it now designed to repress the effusion of blood; its object here is, by strangulating the parts, to mortify, sometimes, quite a considerable portion of them left outside of it. It is to this last kind of constriction that the title, in our times, is given of *ligature in mass*. It is thus that polypus has been treated at every epoch, whether situated in the nose, the womb, or rectum, or even in the ear. Most pediculated tumors have also been treated at every period of science by the ligature in mass. Even amputation of the limbs has been sometimes performed in this manner. I have related several examples of this kind under the chapter on Amputations in general. When castration is performed, it is allowable to embrace the whole of the testicular cord in a ligature, and to

strangulate it in mass. The ligature for fistula in ano, so frequently employed in the last century, was nothing more than the ligature in mass. We see by these examples under what circumstances the strangulation of the parts ought in reality to receive the name of ligature in mass, and to how many and to what kind of operations this description of remedy is applicable. To effect it the surgeon may make use of all the different kinds of ligatures imaginable; those of silk, thread, linen packthread, cord, fibres of plants, lead, silver, gold, platina, and maillechort, rendered flexible by the various means known in the arts, furnish the same resources for the ligature in mass as for the simple ligature of vessels or for sutures. Nevertheless, we cannot indifferently employ any one of these substances in preference to another. Should we require a ligature somewhat small in size, and which should be at the same time very supple and strong, the silk ought to be preferred. If it is required to effect a firm constriction of a soft tissue with a root somewhat large, a ligature of hemp, made by twisting three, four or five strands of simple thread, presents the most advantages. Packthread, which might be substituted for it, has the inconvenience of adapting itself with less facility to the bottom of the parts, and of untying itself too easily. It is advisable, moreover, in place of besmearing them with soap, as some persons have recommended, to rub the strands of the thread or packthread with wax, which prevents, or at least diminishes, its tendency to slip. Tissues of plants or ligatures of linen ought not to be employed unless none better can be obtained. As to metallic ligatures, however pliant some may consider them, they never possess the flexibility of thread, and cannot obtain the same generalization in practice. They consequently ought not to be preferred, unless there is necessity of a very great degree of constriction, or to put ourselves on our guard against the dissolution, putrefaction, or physical alterations of the ligature. There are also some cases where substances, which would be susceptible of solution and absorption by the living organs, might have an advantage. Thus to strangulate an intestine, either transversely or on its side, and in such manner as to return it immediately afterwards into the belly, it would be a precious advantage to have the use of ligatures which, as soon as they were applied, would cease to act as a foreign body. For this purpose there has been used silk in its natural or raw state, deerskin, chamois leather, gold beaters' skin, catgut, &c. But in addition to the fact that ligatures or threads fabricated out of these substances, are deficient in solidity, they have moreover the inconvenience of not being absorbed, except in a few cases, without exciting inflammation or suppuration. The ligature in mass is not applied in all cases in the same manner. If in some cases we limit ourselves to encircling the part by placing the ligature immediately upon the skin without any previous incision, we on other occasions commence by dividing the integuments upon the same circle which is to receive the ligature. These two modifications of the ligature in mass were known at a very ancient period. In the method known as M. Mayor's, and which, since the time of Hippocrates, all surgeons occasionally employ, we commence by laying bare and dissecting the parts which it is our intention to destroy, and it is not

until after we have isolated them nearly down to their root, that we surround them with the ligature and strangulate them. This last method is daily applied, as it has been for ages past, for the extirpation of tumors of the axilla after the removal of cancers of the breast, also in the ligature of the spermatic cord, etc. The various modifications of the ligature in mass are nevertheless all classified under two general methods, viz: the ligature without previous dissection of the integuments, and the ligature after the dissection of the tumor.

#### ARTICLE I.—LIGATURE WITHOUT DISSECTION.

The ligature in mass, without previous dissection, comprises three varieties: the thread or ligature is applied on the integuments without any other precaution, or after a circular incision of the skin, and sometimes also after having cut through the tissues behind the root of the body which is to be destroyed. The ligature upon the integuments, whether they are cutaneous or mucous, is effected by means of all the different kinds mentioned above. Some surgeons of former times, and some practitioners of the ancient academy of surgery, had proposed in such cases to saturate the ligature with some caustic matter, in order, they said, that it might more rapidly cut through the tissues. This precaution, which rendered the operation obviously more painful, augmented the inflammation, and did not sensibly hasten the fall of the ligature, and which moreover rendered it more brittle, is no longer employed in our time. It is by a mechanical action, and not by its chemical properties that the ligature, thus applied, is to produce its effects. This description of ligature, which is applicable to cutaneous tumors, whether they are fibrous, vascular or horny, when they have a narrow root and are easily raised up, is equally applicable to bodies that are fibrous, mucous, or of any other character, which are found in the interior of the mucous cavities. To accomplish it we require a ligature properly prepared, and of a strength, breadth and thickness proportioned to the volume of the tumor, or the degree of constriction to be used. The ligature being arranged, the surgeon causes the tumor to be raised up in such manner as to surround its root a little behind it, and upon the sound tissues. If the pedicle of this tumor is purely cutaneous, there is no danger in strangulating it. When it is rather more cylindrical or conical than dilated (*renflée*), we may limit ourselves to applying the ligature upon its neck without making the least traction upon it; on the contrary it may be advantageous to raise it up with a certain degree of force while we are applying the ligature, if we do not wish to incur the risk of leaving behind a certain portion of the degenerated tissues.

It sometimes happens, that, in order to prevent the ligature from slipping, from the integuments towards to the tumor, we are obliged to give it certain points d'appui on the confines of the diseased region. It is in this manner that an erigne, a tenaculum, or a hook forceps with very convex teeth, sometimes becomes necessary. The tumor being drawn upon by an instrument of this description, obliges the ligature to glide backwards, in proportion as it is tightened. As it is

sometimes necessary that this last precaution should be rendered permanent, it has been proposed to pass, at first, a simple metallic stem, or two similar stems crosswise, under the root of the tumor, in the manner I proceed, and as M. Davat has done, for the ligature in mass, on varices. These stems, having transfixed the tissues firmly, retain the ligature, which is placed behind them; in this manner we strangulate without any great degree of difficulty, and circularly, non-pediculated tumors. I have mentioned farther back, what has been obtained from this description of ligature, in the treatment of erectile tumors. As it is difficult to strangulate the parts completely, when they have a considerable degree of thickness, it was readily suggested, that we should embrace a portion only of the base of large sized tumors with each ligature, to pass two, three or four ligatures in order afterwards to mortify separately each of the parts, or one of the four triangles of the pedicle, when the threads have perforated it crosswise. Should it be desired to apply a double ligature, we take a long waxed thread, with a needle, pierced near its point, and having a handle, or a long common needle slightly curved, or a probe, inserted in a canula which a trochar had previously enabled us to plunge through the tumor. We pass the thread behind the root of this last. Having immediately cut it near the needle, or disengaged it from the eye which conducted it, the thread is instantly un-doubled; we then seize hold of one of its halves which is tied into a knot on one side, and then do the same with the other, on the opposite side, taking care to tighten them in a proper manner. In this way, the ligature strangles only a portion of the mass. As it acts, moreover, from within outwards, it produces as much effect as if the tumor was only half the size that it is. If, as M. Warren (*on Tumors, etc.*, p. 418) appears to have often done, we should incline to divide the tumor into four parts, by means of threads, it would be advisable to insert the four ligatures in succession, and to give the preference to the needle of J. L. Petit. Each thread would thus circumscribe a quarter of a circle, and the entire circumference of the tumor would finally become strangulated. Finally, it would also be practicable to imitate Somm , who, wishing to divide the bridle of a pseudarthrosis, plunged in his ligature, and brought it out by the same opening, after having passed it around the tissues to be divided, a method, which, as I have elsewhere said, appears to have also been made trial of for varices. We should, therefore, insert by puncture, and sub-cutaneously, by means of a needle slightly curved, or any other instrument, a ligature upon the contour of one of the halves of the mass. Brought again, by a second puncture, to the opposite extremity of the great diameter of the tumor, the ligature would be conducted in the same manner upon the other side, and brought out at its point of departure. We should, in this way, procure a circular constriction, which would in no respect interfere with the integuments, and perform an operation entirely under the skin. A last mode of strangulation, without previous dissection, and which has already been employed by some surgeons, by M. Manec among others, consists in introducing as far as the centre of the tumor, four metallic stems, each armed with a hook, which, darting through it in the manner of a spring, afterwards divides the tissues from the cen-

tre to the circumference by means of a quick screw adjusted to their free extremity.

#### ARTICLE II.—LIGATION IN MASS, WITH DISSECTION.

The surgeon has often a good deal of embarrassment when completing the separation of tumors that are deeply situated, or organs whose pedicle is nourished by numerous vessels, which cannot be seized without difficulty, or that are of large size. This is seen in the extirpation of the tongue, the removal of cancerous tonsils, the thyroid body when degenerated, and in most of the tumors of the neck, axilla, groin, &c. It is easy to be conceived, that the surgeon, who has to extirpate a cancerous tonsil or tongue, must necessarily be intimidated with the hemorrhage which may result from such an operation. All extirpations of goitre have also been considered formidable from the same danger. M. Mayor, (*Essai sur la Ligature*, etc., Lausanne, 1821; *Essai sur la Lig. en Masse*, Paris, 1826,) in giving more importance than any other person to this inconvenience in bloody operations, has suggested that a ligature which would embrace the root of the tumor, would enable us to penetrate deeper down than with the bistoury, while offering, at the same time, to the operator all the security desirable. So that the ligature in mass, with previous dissection, and which was formerly but seldom had recourse to, is now in sufficiently general use. It is effected, moreover, with the same substances, and by the same processes, as the preceding method. Thus, in order to accomplish this, we may make use of threads, of silk, hemp or flax, ligatures of linen, packthread, or cord, wires of lead, silver, or other flexible metal or the different kinds obtained from animal tissues. In the same way as for the ligature in mass, externally, we might imbue the thread with caustic or medicated material, or apply it without any other precaution, upon the root of the tumor, and prevent its slipping by the various means employed to arrest the knot in the ligature upon an artery. If the body to be strangulated is voluminous, it is advisable, at first, to perforate it with a double ligature, the two portions of which are afterwards separated, in order to form a distinct circle, applied to each half of the pedicle we wish to mortify. Nothing, moreover, would prevent our dividing the root of the tumor into four portions, by means of four separate ligatures; but the ligature in mass, with metallic wires, would be applicable after dissection only, to tumors whose entire contour and root passed beyond the level of the integuments. If, however, in order to effect its strangulation in a proper manner, it should be thought advisable to insert the metallic stems crosswise, through its root, it would still be practicable to recur to this, provided we took care to withdraw them shortly after, that is to say, as soon as the ligature had cut sufficiently deep into the tissues to prevent it from any longer having a disposition to slip.

#### ARTICLE III.—MANNER OF EFFECTING STRANGULATION BY THE MASS.

The object here is to interrupt all kind of circulation and physiological action in the mass whose pedicle is constricted. The

better way would then appear to be, to strangulate the parts at first as powerfully as possible. Nevertheless, the ligature in mass is sometimes employed in such manner as to cut or strangulate only by degrees, the organs which it embraces. If the ligature has but little volume and acts insensibly, it may happen that the first organic layers cut by it do not mortify, but even reunite external to it, so as to imprison it, before its action has been brought to bear upon the tissues which are deeper situated. M. Mirault noticed this in a case of strangulation of the tongue; what I myself have also seen, and what J. L. Petit had already noticed after a ligature in mass upon the testicular cord; which result I have witnessed also in the case of a child who had strangulated the penis with a simple thread. This species of constriction, therefore, is for the most part very uncertain. Nevertheless, there might be cases where it would be advisable, provided that by thus cutting through the tissues by degrees without mortifying them, some prospect might be obtained of effecting a radical change (*modifier profondément*), in their morbid condition. We shall find, in fact, in speaking of operations performed upon the tongue, that the patient treated in this manner by M. Mirault, ultimately recovered of his cancer. If, however, the strangulation at first is sufficiently powerful to arrest the passage of the fluids, the tumor, which is immediately deprived of its vitality, first becomes blue and livid, and then softens, shrinks and loses its volume. From this it happens that the ligature is no sooner sufficiently tightened, than it slips and is displaced, and no longer makes any constriction. In this point of view, practitioners in my judgment appear to have examined but one of the points of the question. If the ligature changes place before the entire physiological circulation in the tumor has been suspended, it is clear that life may be re-established and that our object will be defeated. If, however, this displacement does not take place until at the expiration of 24 hours, or in consequence of the shrinking of the tissues, our purpose, nevertheless will be attained. After this first result, however, the consequences will be the same, whether the ligature remains or is removed. Every thing existing external to the ligature is effectually mortified, represents an eschar, and acts in the same way as a foreign body which must necessarily come away through the eliminating powers of the system. We see in these cases a line of demarcation established between the living and dead parts, while a process takes place in every respect analogous to that which detaches the eschars from a burn. For which reasons, my rule is to remove the ligature at the end of one or two days, when it incommodes, or when it is not my design to increase its constriction from day to day. As to the manner of performing this strangulation, it presents a certain number of modifications.

### § I.—*Simple Strangulation.*

Whether the ligature to be applied is to be external or deep-seated, we nevertheless frequently confine ourselves to strangulating the pedicle of the tumor by a double or even a single knot, in the same way as in tying an artery. Nevertheless, as it is almost always necessary to constrict the parts as strongly as possible, the first knot requires to

be firmly secured while we are adjusting the other. To effect this we have three resources: 1. An assistant holds the extremity of one of his fingers accurately placed upon the crossing of the threads, while the surgeon prepares the second knot of the ligature; 2. should the finger be found too large for this purpose, we substitute for it the blunt extremity of any metallic instrument whatever; 3. or what is still more secure, we firmly embrace the first knot with the point of a forceps. Still another means consists after the first knot is made, in carrying the two portions of the ligature again around the tumor, in order to knot and tighten them in the same manner upon the opposite side. Whatever mode is adopted, it is advisable to cut one or both of the free portions of the ligature near the knot. We cut both, should nothing prevent our seizing hold of, and dividing the knot at its place, when we judge proper. We leave one, on the contrary, when we consider it advisable that we should have a guide to remove the ligature at a proper time. If the ligature is intended to be temporary, we might, after having tightened it, adjust its first knot by a simple rosette (bow-knot). By this means we may readily withdraw the ligature at the end of one, two, three, or four days, and disembarass the parts without dividing anything.

## § II.

In place of this sudden strangulation, we sometimes have recourse to a graduated constriction, a constriction which, notwithstanding the shrinking and withering of the divided parts, shall act in such manner that the strangulation of those which remain, is not at all relaxed, but continued up to the time of their complete separation. For this purpose, quite a number of different modes have been devised. One of them is so ingeniously arranged that the ligature tightens itself in proportion as the tissues recede. To accomplish this M. Pelletan has contrived an instrument more ingenious than those of Levret, and which is represented by a stem with a double canal, having at its free extremity a sufficiently powerful spring, which receives the extremities of the ligature which have been previously passed around the tumor, and which constantly tends to make traction upon them, (*les entraîner*). Others have invented ligatures whose constriction may be augmented or diminished at pleasure. All the kinds of knot-tighteners (*serre-nœuds*) nearly, belong to this description. Whether, in fact, we make use of the *serre-nœud* of Levret, that of Deschamps, Desault, Dubois, or even the simple bow-knot, we may, nevertheless, renew at pleasure the degree of strangulation we have at first produced. When we have surrounded the tumor with a metallic thread, it will be sufficient to twist the two free portions in a spiral manner around each other, if we wish to make daily increase of the constriction. The most ingenious instruments we possess of this kind are those of M. Bouchet, M. Mayor, M. Graefe, and Dupuytren.

The knot-tightener of M. Bouchet is a sort of rundlet traversed by the two threads, and around which they are attached in order to be shortened to the degree desired. M. Mayor, reviving an idea formerly thrown out by Roderic, has proposed to pass the two united extremities of the noose of the ligature which surrounds the tumor,

through a series of beads or small balls of wood, ivory, horn, bone, silver or any other substance, in the manner of stringing the beads of the Paternoster. The first of these beads being pierced with two holes, allows of tightening the two halves of the ligature strongly upon the last, and of forcing the other in a proper manner against the tumor. To do this with still greater ease, we may replace the outer half of this chain of beads by a metallic or ivory tube, and make use of a small winch (*treuil*) to receive the extremities of the ligature. We have, by this means, a ligature which terminates in a flexible stem, which adapts itself with facility to the parts, and interposes no obstacle to the gradual strangulation of the tissues. The knot-tightener of M. Graefe, as modified by Dupuytren, receives by one of its extremities the double thread of the ligature. This ligature is then attached by several turns to a small lateral nut, (*écrou*), which is separated from or approximated to the wings or outer extremity of the instrument at pleasure, by means of a quick-screw, (*vis de rappel*.) (See article, *infra*, on *Polypi of the nose, uterus, &c.*)

#### ARTICLE IV.—APPRECIATION.

The ligature in mass, applied exclusively and alone, and adjusted by a common knot as near as possible to the root of the tumor, more frequently answers the purpose than is generally supposed. It is in fact, in most cases, not at all necessary, as some think, to renew the constriction and tighten the ligature daily. I have seen enormous tumors yield to this kind of constriction kept up for twenty-four hours, or even in some cases for only twelve hours. An immense polypus of the pharynx and nasal fossæ thus strangulated for the space of some days, and divested of its ligature a long time before it had been completely cut through, nevertheless separated at its root. How often have we not seen polyti of the uterus, treated by the ligature, detach themselves beyond the point which had been touched (*touché*) by the thread, and although the constriction had been actually maintained only for the space of a few hours! Nevertheless, this species of strangulation is not as suitable as the others, when we have to include a great mass of tissue. It is in such cases that partial or progressive strangulation merits the preference. Partial strangulation by means of threads passed through the tumor, acts more promptly and with more certainty than the simple ligature; but it is applicable only to external tumors, and would not be adapted to those whose pedicle includes voluminous vascular trunks, or large sized nerves. Here, therefore, we should make use of gradual strangulation. Underneath the skin this last mode would, at first, present great difficulties, and would not probably succeed until after having transformed the tumor into a vast abscess, at the same time without giving assurance that the integuments would be preserved. The process of M. Manec is, undoubtedly, the most difficult and most embarrassing, and the least certain of all. By means of knot-tighteners, should we use that of M. Pelletan, the results we would produce could only be imperfect and incomplete. The instrument of M. Graefe, when a straight and inflexible stem, is not attended

with any serious inconvenience; or on the contrary, the chaplet of Roderic, as improved by M. Mayor, may enable us to dispense with the others, and presents all the requirements of force and simplicity desirable. As for the rest, it is not to be forgotten, that the operation is practicable with all these instruments and by all these processes; which, nevertheless, does not exempt me from adding that the ligature in mass never should be the method of election, when it is practicable to employ the cutting instrument without manifest danger. The ligature in mass, used in the manner I have described, causes the separation of the tissues at the expiration of a period of time, which varies between three or four days and two or three weeks.

During all this period the tumor passes into a state of putrefaction, is decomposed, and emits an odor which is usually offensive, together with discharges which possess a certain degree of acrimony. Hence the extremely unpleasant consequences, both to the patient and those who approach him; and hence the real dangers which may result from this state of things by means of resorption, infection or poisoning. I have, therefore, been in the habit, when I have employed this operation, of excising from a half an inch to an inch of all that portion of the ligature which was found outside, as soon as the circulation appeared to me to have been sufficiently destroyed in the centre of the tumor. I remove the ligature itself at the end of four or five days, when this first excision convinces me that there no longer remains any degree of vitality in the circle of the constriction. The patients are thus relieved from an actual pestilential ulcer, (*foyer*,) and they have nothing more to undergo than the eliminative process from all the different points, similar to that which detaches the eschars from a burn, contusion, or gangrene. It is nevertheless true, however, that with the exception of a small number of cases, the ligature in mass will always be the favorite operation with surgeons who have but little experience with the knife, or not much confidence in their anatomical knowledge, or the steadiness (*sûreté*) of their hand. No one, however, as I think, would undertake to contend, that an operation finished in a few minutes, and which leaves a fresh and living wound, can be where all other things are equal, less advantageous than an operation which cannot be completed in less than from eight to fifteen days, which is accompanied with all the phenomena of gangrene, and the wound made by which does not begin to become cleansed, until at a period when that of the other may be perfectly cicatrized.

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## CHAPTER XIII.

### FOREIGN BODIES.

Numerous foreign substances, and of different kinds, may exist in the human body, and require the intervention of surgery. Some-

times these substances come from without, and at other times form in the midst of the parts themselves. The sequestra of bones, eschars within the soft parts, certain accidental productions, different sorts of calculous concretions, the decomposed products of fecundation, whether uterine or extra-uterine, &c. &c., belong to the last-named class. Substances derived from three kingdoms of nature, and which, having once entered into the living cavities or tissues, are arrested there as anomalous, and remain there as morbid causes, are to be enumerated under the first class. The organs most exposed to these kinds of accidents, are the ear, frontal sinus, eye, nares, mouth, maxillary sinus, the air passages, œsophagus, urethra and bladder, vagina and womb, and the rectum and intestines in general. It will be while examining the operations required for the diseases of these different organs or regions (*appareils*) that the occasion will present of speaking, also, of the foreign bodies which are found in them. I do not therefore intend, at this moment, to treat of other foreign bodies than those that are attached to, or formed upon other regions of the animal economy.

#### ARTICLE I.—TRUNK.

##### § I.—*The Head.*

In this series we shall find foreign bodies in the head, face, chest and abdomen. Projectiles thrown by powder, as powder itself, lead, and especially balls, langridge (mitraille) discharges from bombs, or howitzers, biscayans, and even small bullets, are frequently found there. Then come pieces (tiges) and fragments of metal, wood, wadding, clothing, flints, portions of glass, &c. There are no regions where these different foreign bodies have not sometimes been encountered. A ball which was found near the gullet, (*Transact. Phil.*, 1738, p. 449, art. 6,) had entered there by passing through the lower jaw and tongue a year before. A dice (dé) entered from the pharynx of a child into the pterygoid fossa, (Parrish, *Encyclogr. des Sc. Méd.*, 1836, p. 321.) I have removed, through the mouth, a ball which a boy, aged fifteen years, had driven by the discharge of a pistol into the body of the fourth cervical vertebra. Marchettis (Bonet, *Corps de Médecine*, t. III., part 2, obs. 25, p. 230,) speaks of the fragment of a fan, which having been introduced through the orbit into the upper maxillary bone, made its way out, and was extracted in part externally, and partly through the palate, at the expiration of three months. A man, fifty years of age, whose case is given by Muys, (Planque, *Bibl.*, t. I., p. 43, in 4°.) had in an abscess below the ear, a portion of pipe which he had forced into his throat six months before. Percy (*Manuel du Chirurgien d'Armée*, p. 109,) relates a great number of cases where various foreign bodies had in this way become lodged in the head. A patient mentioned by De La Motte, (*Tr. Compl.*, t. I., p. 718, ob. 205,) received a sword thrust between the gum and nose, and the weapon breaking, perforated near the ear and remained of the thickness of a farthing external to its place of entrance. The wound cicatrized over it, suppuration took place near the ear, and no attempt was made to extract the foreign body. A man, in despair from being paralyzed, discharged a pistol into his

mouth. The following day he told me he had felt the ball descending into the stomach, and he was no longer paralyzed! Watching the symptoms, I noticed, on the eighth day, a slight degree of emphysema over the left eye. I cut down and extracted the ball, which had shattered and contused the orbital arch. This patient was cured both of his wound and paralysis. In the case of a wound, related by Donnadiieu, (*Anc. Journ. de Méd.*, t. VIII., p. 549,) the point of a copper spindle remained for thirteen months fixed in the cheek and one of the jaws. At first its presence was not noticed. A sinuous ulcer finally disclosed it, when the metallic point was extracted, and the cure took place. Courgeolles (*lb.*, p. 551,) makes mention of a fragment of wood, which having become implanted or imprisoned in the bone near the supra-orbital notch for the space of fourteen years, had produced no other result than a warty excrescence, which successively disappeared and returned without the patient taking any farther notice of it. In F. de Hilden, (Bonet, *Corps de Méd.*, p. 160,) we find the history of a ball which had remained for six months between the cranium and dura mater. A patient of Morand, (*Opusc. de Chir.*, p. 159, 1re partie,) who died at the expiration of nine months, presented a similar fact. Analogous cases have been related by a great number of surgeons, and especially by M. Larrey, who also speaks of ram-rods traversing the cranium without causing immediate death. An example of this kind has just been published by M. Zedleg, (*Gaz. Méd.*, 1838, p. 379.) A ball had been retained for eighteen years above the orbit, in the substance of the frontal bone on the right side, and the patient, who in other respects had been in quite good health up to that time, died of apoplexy. Tho-massin, (*Extraction des Corps étrangers*, etc., p. 16,) in the case of a child aged twelve years, saw an arrow forced through and through the apex of the cranium, but which, however, was extracted, with a successful result. A patient who had carried for the space of four months a similar body in the brain, was cured by M. Majault, the father, (*Mém. de l'Acad. de la Chir.*, t. I., p. 316, in 4°.) but Majault, the son, operating at the expiration of eleven years for a similar lesion, lost his patient on the third day, (*Journ. de Méd.*, t. XLI., p. 82.) Solingius (V. D. Wiel, cent. 11,) was more fortunate, and succeeded in extracting from the cranium a portion of the blade of a sword, which had broken there after having entered by the great angle of the eye. The point of a poignard, which had broken in the cranium, and which at first could not be extracted, became detached almost of itself at a later period, (Bartholin, cent. 4.) A portion of the stock of a musket, which had been for two months in the brain without causing any accidents, after being extracted, was followed by death, (*Journ. de Méd.*, t. I., p. 242, obs. 8.) [See remarkable and recent cases of these injuries in our notes under *Trephining*, Vol. II.]

### § II.—*Thorax.*

If we pass from the head to the *chest*, we shall find that an ear of wheat, (A. Paré, liv. 25, chap. 16,—Bally, *Revue Méd. Franc. et étrang.*, etc.) and needles and pins swallowed by accident, have made their way through the lungs, and finally, after having produced

an abscess there, and sometimes even without any previous morbid changes, have finally shown themselves under the skin. Every body knows the case related by Gérard of a knife blade which had become fixed in a rib in such manner as to project into the interior of the thorax more than from the outside of the rib. Bidloo, Bagieu, Desport and M. Terrin, mention cases where they had to extract balls from between the ribs, where they had either entered or were making their egress. Wherter, (*Journ. Gén. de Méd.*, t. LXIX., p. 423,) on the authority of the military surgeon Hunter, mentions a bis-cayan of three ounces which, after having fractured the ribs, lost itself at the depth of five inches in the lungs. The fragments of broken bones were exsected, the foreign body extracted, and the patient cured; but this account is so problematical that we may place it by the side of that which mentions a ball of seven pounds' weight which had travelled into the haunch! Broussais (*Histoire des Phlegmasies Chroniques*, 2e edit.) speaks of a soldier who died at the expiration of fifteen or twenty years, with a ball in the lungs, without any person having suspected it; and Thomassin (op. cit., p. 96,) relates that he found a ball in the right lung of a man who died at the expiration of three weeks from wounds disconnected with this last. Briot (*Hist. de la Chir. Milit.*, p. 97,) cites a case where a ball, after having passed through the scapula, became wedged in between two ribs.

Having dilated the wounds and glided the beak of a spatula behind the foreign body, its extraction was effected while the patient made a strong inspiration. In the memoirs of M. Larrey, (*Ibid.*, t. IV., p. 259,) we find the case of a ball, weighing ten drachms (gros), which had perforated the thorax between the eighth and ninth ribs. The surgeon could not effect its extraction until after having notched out, by means of a blunt-pointed bistoury, the whole breadth of the lower rib, down to within two lines above its arterial border, to such extent that the patient, in a sudden flexion of the trunk, fractured the rest of this bone, wounded the intercostal artery and produced a hemorrhage, which was finally restrained, but not without difficulty, by means of the process of Desault. The same surgeon had, moreover, some time previously, extracted a ball weighing six drachms without previous exsection of the bones. A girl who received the discharge of a pistol in her back, died on the twentieth day. The ball which lacerated (rompu) says F. Plater (Thomassin, op. cit.) the spinal marrow had implanted itself into the body of the ninth vertebra. M. Burnes (*Archiv. Gén. de Méd.*, t. XXVIII., p. 411) speaks of a fork which was extracted from the back of a patient without its being known how it had entered there. Foreign bodies of another description also, have quite frequently been found in the body (épaisseur) of the chest. I will relate here two singular cases. A convict died of a visceral affection at the hospital of Rochefort (Guillon, *Presse Médicale*, t. I., p. 151.) In this man a foil (fleuret) was found in the chest which had transfixed it completely, one of the extremities being in the substance of one of the ribs, and the other in the body of a vertebra, while the middle portion, covered with stalactites, was enclosed in the body of the lungs. It was ascertained that the wound had been made fifteen years before, and no one sus-

pected that a foreign body of such a character existed in the thorax of the patient. A case not less remarkable, but in which the consequences were more disastrous, was presented at La Charité, in 1836. While on exercise, an officer of the National Guards, of Paris, received in his back a musket ram-rod of large calibre. This rod penetrated to the depth of fifteen inches, taking an oblique direction from the left dorsal region to the right breast. Tractions made by a number of surgeons, and men of great strength, near Sceaux, where the accident happened, could not in the least degree move the foreign body. I was enabled in the evening to examine this patient at the hospital, whither he had been removed. After the facts communicated to me, and after comparative measurements of the remaining portion of the ram-rod and the musket, with another ram-rod of similar calibre; and after having struck several times upon the metallic point, which projected about five inches from the dorsal region, I had no doubt that it had perforated through and through the thorax. No serious accident had yet occurred, and the patient suffered but little. What in such a case was to be done? The removal of the rod might give rise to a hemorrhage and effusion of blood which might suddenly prove mortal; there was room for apprehending that the aorta, vena cava, or even the heart might have been transfixed (*embrochés*)—[this conjecture scarcely seems supportable, T.]—and that in removing from them the species of plug which had shut up their perforation, the sources of life would have been instantly extinguished. But by leaving it in its place could we, on the other hand, hope that the wounded man would survive? For how could we conceive that a rod like this, traversing organs so important, would not soon give birth to accidents that would prove speedily fatal. The case of M. Guillon was not then known to me, and if it had been it would have strengthened me in the step I deemed it proper to take, which was that of delay.

This course, moreover, was one of necessity. Our surgical resources, rich as they already are, have nothing which would enable us to extract a body of this description. I hoped that the process of suppuration taking place around the foreign body, would soon render it movable, and allow of its being removed, at the same time that it would obliterate the vessels, if any had, in reality, been wounded. At all events, I caused to be constructed, by the ingenious artist, Charrière, an instrument which would have carried out my views, had not the patient, in spite of the most rigid antiphlogistic treatment, succumbed at the expiration of four days, almost suddenly, without having given any positive evidences of pneumonia or effusions in the chest. The opening of the dead body disclosed to us, that the rod had traversed one of the dorsal vertebræ, at a line in front of the spinal canal; that afterwards, grazing the vena cava ascendens, and passing under the base of the heart, it had passed through the lung to arrive between the ribs under the right breast, where it still remained. The larger vessels and the heart were intact. The lung, though slightly engorged, was not inflamed; it would appear that death had been caused by the effusion of a certain quantity of blood into the bronchial tubes, (*les bronches*), laid open in the track of the rod. I then made an essay with the instrument of

M. Charrière, and we found that it would have perfectly fulfilled the indication. This instrument is composed of a large metallic plate, which was intended to have its support upon the back, after having allowed the projecting portion of the rod to pass through it. This last being admitted into a solid tunnel, or sort of socket, itself sustained upon the plate mentioned, furnished support to a nut, by which the action would have been made upon the foreign body without any unsteadiness, and in a gentle manner, after the manner of a quick screw from before backwards, permitting all the force requisite to be used, and that without exposing to any kind of concussion. If this instrument, which could not be completed until the day the patient died, had been accessible at the first, perhaps I should have had recourse to it: would the patient, in that case, have survived? This is precisely the question which will always cause the greater number of surgeons to hesitate under such circumstances. I will nevertheless add, that hereafter, notwithstanding the case published by M. Guillon, and the defence of it by M. Larrey, I would adopt the resolution of extracting the foreign body, rather than abandon its dislodgement to the resources of the organism.

[The difficulty in having at our disposal the ingenious contrivance mentioned, is that such accidents are too rare to have these apparatus on hand, already fabricated. The principle, however, could be very readily adapted, we should think, in a few minutes, to a temporary construction. This case vividly calls to mind the unparalleled one in our notes, Vol. II., under *Trephining*, of a long sharp chisel, implanted deep into and through the vertebral column, and which, by herculean efforts, was extracted on the spot, the proper course undoubtedly. T.]

### § III.—*Abdomen.*

Foreign bodies in the abdomen, like those of the thorax, arrive into this cavity sometimes directly from the exterior, sometimes after having passed through the mouth and cesophagus. A boy (Planque, *Bibl. de Méd.*, t. I., p. 46,) thirteen years of age, having swallowed an *ear of barley*, discharged it three weeks after, by an abscess which was formed in the left hypochondrium. The same accident was followed by the same result, in a little girl in Silesia, (*Journ. des Savants*, October, 1688.) When balls, lead or other projectiles strike the abdomen, they enter into the peritoneum, or are arrested in the thickness of the soft parts. In the last case, the foreign body should be extracted without hesitation, by the ordinary processes. Should the ball have dragged in with it in such manner as to have pushed ahead of it, and become wrapped up (de manière à en rester coiffée) at the bottom of the passage, in a portion of the clothes of the patient, nothing more would be required than to make action upon this last, in order to remove the whole. It is what I did successfully in two of the wounded in 1830, and each of whom had received a ball, one below and to the right of the umbilicus, and the other to the outside and left of the same point. Supposing, on the contrary, the projectile had fallen into the peritoneal cavity, and that there was no means of ascertaining precisely its exact situation, every attempt at extraction would be fruitless, and in fact extreme-

ly imprudent. It is difficult to conceive, therefore, how the contrary rule should have been reproduced in a recent treatise upon wounds from fire-arms, and that a surgeon should not hesitate to advise that the abdomen should be freely laid open, and that we should perform a sort of gastrotomy, to go in search of balls that have wandered among the convolutions of the intestines. Once in the belly, the ball may cause there various disorders. In a man who had received the discharge of a pistol, and whom I saw with Bogros, the ball had opened the hypogastric vessels, and speedily caused death. A similar fact has been published by M. Gibson. It is known that Carrel died of a wound of the intestines, and that the ball in him remained in the belly. Though in such a case we should even succeed in withdrawing the projectile, what would thereby be gained? It is the wounds it has caused, and not its presence, which is the source of the danger. Who, moreover, does not know, that balls, lead, and buck-shot, left in the midst of the tissues, become encysted, and frequently remain there a considerable length of time without materially disturbing the functions? Does not M. Larrey (*Clin. Chir.*, t. II., p. 521,) inform us that balls which had traversed the pelvis, rectum and bladder, have nevertheless not prevented the wounded from recovery? If the projectile was still in the tissues, we should even take care, while trying to extract it, that we do not cause it to fall into the belly or pelvis, as happened to that practitioner mentioned by Theden, (*Thomassin, op. cit.*, p. 31.) As to foreign bodies that have arrived through the digestive passages, they have given rise to certain results, exceedingly curious. Legendre (*Biblioth. de Planque*, t. III., p. 560, in-4°) speaks of an individual who, after a certain lapse of time, discharged per anum a *fork* which he had swallowed. Who is not familiar with the history given by Habicot, of the poor boy who, to protect them from robbers, decided upon swallowing his ten pistoles of gold, and who after being on the point of being suffocated, discharged them piece by piece, through the anus, during the space of fifteen days? A curious history of this kind is that of Pierre Yvens, related in the *Journal of Blégny* (*Nouv. Découv.*, Mai, 1679, p. 188; et *Bibl. de Planque*, t. I., p. 51.) This man, who was an extravagant character, swallowed the steel (affilior) of a hog-killer, and retained it thus during five or six months. Not until then did an abscess form in the right hypochondrium, and allow the unfortunate porker to recover his instrument, which he had believed lost forever. Some time after, this foolish sort of fellow swallowed in the same way the leg of a porridge-pot, which he voided by an abscess in the left hypochondrium. Attaching no importance to these abscesses, Pierre Yvens took it in his head also to swallow a pocket-knife with its handle, (*gaine*), which at a subsequent period came out above and by the side of the lumbar vertebrae. A. Paré also relates (*Traité des Monstres*, liv. 25, chap. 16, p. 772,) upon the authority of Cabrolle, the history of a shepherd who was compelled by some robbers to swallow a *knife* half a foot long, and which remained in his body during the space of six months. An abscess having formed below the groin, allowed of this foreign body being extracted from it. Besides the other analogous facts related by Paré, there is also mention made of the operation of gastrotomy per-

formed upon A. Grunheide, (*Bibl. de Planque*, t. I., p. 54,) for the purpose of extracting a knife which had entered his stomach through the mouth.

Quite a great number of cases of gastrotomy to remove a knife directly from the stomach, have now been related. M. Larrey (*Clin. Chir.*, t. II., p. 269-369) says that Grager had recourse to this operation in 1613, and that Frisac also at Toul employed it with success. Beckher (*Arch. Gén. de Méd.*, t. XV., p. 274,) who, in the seventeenth century, makes mention of a similar operation and Bernes, or Barnes (*Ibid.*,) who, according to M. Marion (*Thès*, No. 294, Paris, 1831,) had occasion for it,—do they refer to the same fact, or did each one have a case of gastrotomy? What prevents our rejecting such examples as manifestly apocryphal, is the fact that they are occasionally, in our own time, recurring in such a way as to dispel every kind of doubt. Caiyroche (*Bull. de la Fac. de Méd.*, t. VI., p. 451) gives a case of gastrotomy successfully performed upon a lady, who, for a long time previous, had had a fork in her stomach, and Valentin (*Ibid.*, 1807) relates a similar case of a silver spoon. At Paris, in fact, A. Dubois (*Ibid.*, t. VI., p. 517) was seen to take from an abscess in the iliac fossa, the blade of a knife which the patient had swallowed a long time previous. A misanthrope made an attempt upon his life and did not succeed; he then swallowed a tea-spoon. Nine months after, a tumor, which supplicated, appeared at the epigastrium. M. Otto (*Bull. de Therapeut.*, t. XV., p. 320) perceived it, and through this exit removed the foreign body, which was yet but little changed. The cure took place rapidly. [See notes under Special Operations, infra. T.]

Instances of a similar character of swallowing jackknives, table and pocket-knives, bits of broken wine-glasses and tumblers, which had been first chewed up in the mouth; also of brass buttons, &c., have been very frequent in the United States for the last half century. These feats have been usually performed by reckless and intemperate persons, in high as well as low life, on banters, bets, &c. In some cases they have proved fatal, in others they have passed off, per anum, harmlessly, or after having caused considerable visceral disturbance. The jugglers of Hindostan, some of whom have exhibited in America, fearlessly insert, and that several times daily, a smooth narrow sword of one to two feet in length and near an inch broad, through the mouth and œsophagus, as far down as to the pyloric orifice, without the slightest injury to the parts. T.]

#### § IV.—*The Urinary Passages.*

The emigrations of foreign bodies, which have been introduced through the digestive passages, have at every epoch attracted the attention of observers. A woman, tormented with attacks of colic, was not cured, according to Van der Wiel, until after she had discharged through the urinary passages a ball she had swallowed. Among the examples of calculi of the bladder, which have exhibited for their nucleus, a pin, needle, point of a spindle, ear of wheat, ball, &c., it is probable that many of these reached there by this emigrating process. These substances having arrived in the stomach or intestines, get entangled in some of the folds of the mucous mem-

brane, and gradually escaping outside of them, continue to march in this or that direction, according to the disposition of the parts. Pins, needles, and very slender bodies, may in this way course to long distances without giving rise to symptoms of inflammation. Thus an infinity of cases are related where needles, which had previously been swallowed, had finally made their appearance under the skin. Should such bodies, in traversing through the cellular partitions and layers, ultimately reach the bladder, they might, as will be readily conceived, become there the nucleus of a calculus. Might it not be possible, also, that in becoming arrested in the ureter, after having pierced through the intestine, they would descend without difficulty into the reservoir of the urine? And could we not, in this manner, explain how worms, nuts, kernels of fruit, and beans, have been expelled through the urine? In the case of the soldier, mentioned in the Journal of France, (*Bibl. de Planque*, t. I., p. 48,) and who had a pin in the ureter; would he not, at a later period, have been affected with a calculus? A man about 30 years of age came into the Hospital of La Pitié, for a considerable contraction of the rectum. At the opening of the dead body we found in the pelvis a sub-peritoneal induration, which almost completely closed the rectum. A purulent passage extended beyond this as far nearly as the liver. A calculus of the dimensions of an inch, with a pin for its nucleus, was found between the ureter and ascending colon, at two inches below the kidney. The pin was situated in such way that its head still projected into the intestine, while its point was directed into the ureter. Is not this one of the cases, where nature leaves herself in some sort, to be guided by the state of the circumstances (*prendre sur le fait*)? Does not all this show, that but for the lithic concretion, the pin, escaped from the intestine, would have ultimately descended into the bladder.

#### § V.—*Operation.*

It is unnecessary to remark, that the presence of such foreign bodies does not in itself call for any surgical operation, so long as they do not, by any special manifestation, show themselves externally. When, therefore, they have been swallowed, we must confine ourselves to the conservative treatment of the organism, and wait until they make their way out themselves, or indicate their presence upon the exterior of the body by some particular symptoms. Under these circumstances, whether an abscess is established, or by the touch we distinguish the projection of the foreign body, we must no longer hesitate, but extract it as soon as possible. The rules to follow in such instances are subordinate to the particular circumstances of each case. Thus, should there be an abscess, it is to be opened freely, in order to give exit to the pus, after which, by means of a forceps, we seize hold of the foreign body to be extracted, and take it away with caution. Should the skin be sound, we first incise it to the proper extent, after which, the foreign body having been secured, we should proceed to the required dilatation and enlargement of the track which is to serve for its passage. As the outer surface of the stomach or of the intestines will almost necessarily have contracted adhesions with the corresponding portion of the

abdominal wall, we may enlarge the perforation of these organs without necessarily opening into the peritoneal cavity. Nevertheless, these adhesions being sometimes irregular or very circumscribed, there would be danger in enlarging too liberally in one direction, and an indication presented of having recourse to multiplied incisions. It is, moreover, a remarkable fact, that after these operations the wounds generally close up quite rapidly, even after the digestive cavities have been largely laid open. Experience having established that the cure is not so prompt and certain where ulceration exists as where the organs are merely divided, it is evidently much better to operate in good season than to wait for the tedious processes of nature.

## ARTICLE II.—THE LIMBS.

Foreign bodies when introduced into the limbs, are more easily recognized than in the splanchnic cavities. They act, however, nearly in the same manner, except that they do not travel there by the intervention of the natural canals. It is easy to conceive, however, that small grains of lead or other bodies of small size, might possibly after entering a vein be transported to the heart, and give rise to the suspicion of a lesion of an entirely different nature. This fact, indeed, might involve legal consequences sufficiently serious to justify the mention I have made of it. An inhabitant of Vannes having been engaged in a duel, received the discharge of a pistol in his neck. Repeated hemorrhage and various accidents took place, and death followed on the sixteenth day. The opening of the dead body demonstrated that the carotid artery had been opened, that the ball had entered into the jugular vein where it still remained, that it had formed here a varicose aneurism, and that but for a slight contraction in the vein, the projectile would evidently have fallen into the heart. I have seen the specimen and can guarantee that all that has been said in relation to this case by M. Jorret is perfectly correct. Surgery however could have nothing to do with the extraction of such bodies, unless they had become introduced into the superficial vessels. As to foreign bodies resulting from mortification and necrosis of the bones or soft parts, I have treated of them at sufficient length under the chapter on exsections, to make it unnecessary to recur to them now. There remain then the foreign bodies which have come directly from without, and those which may have come from a distance through the cellular tracks, (*traînées*.)

### § I.

Under these we have *needles* and *pins*. A pin having a head, does not generally go deeper than the level of the skin, and may be extracted without difficulty in almost all cases. It is no longer the same with pins without heads and with needles. Frequently we see these lost in the tissues, while they allow the wound by which they entered to be cicatrized, and cannot be found again without difficulty. A young man sat down upon the point of a needle and pricked himself severely; his master being alarmed, sent for me two hours after. Finding neither a puncture nor the slightest ap-

pearance of a foreign body on the point of the breech indicated by the patient, I supposed he had been deceived, and that the needle had been lost in the chamber. At the expiration of eight days, something sharp-pointed was perceived underneath the skin upon the outer side of the thigh, and which I laid bare with a cut of the lancet ; it was the point of the needle, which then became easy of extraction. A boy eight years of age broke a needle in his calf. He himself insisted that there was nothing left in the leg ; his mother, on the contrary, was convinced that every thing except the eye of the needle had become hidden in the flesh of her child. By dint of searching, I was enabled to discover at the distance of two inches from the puncture a hard point, pressure made upon which caused pain. Having laid open the skin at this place, I found the needle there lying naked, and that it was an inch in length. It would be difficult for me to say how many times the same thing has happened to me in respect to the fingers, palms of the hand, fore-arm, arm, shoulder, foot, body of the leg, thigh and breech. Even the face and cranium are not exempt from similar occurrences. When we are called therefore to such wounds, two cases may present themselves : either by means of a well-conducted exploration we establish the presence of the foreign body in the tissues, and then it is important to extract it forthwith ; or in spite of our most minute researches we find or recognize nothing, and here prudence suggests that we should wait and watch the wound, and that we should be prepared for any event, without affirming that there is nothing there, but also without having recourse to any expedient or any inconsiderate operation. [See notes on Special Operations, inf. T.]

## § II.

After needles, fragments of glass are those which, having been introduced under the skin, most frequently remain there without producing inflammatory symptoms, while at the same time allowing the external wound to close over them. An adult man retained for the space of fifteen months, under the integuments of the forehead above the eyebrow, a triangular plate of glass nineteen lines in length and eight lines in width at its base. For a long time concealed by a cicatrix, this foreign body ultimately showed itself externally and projected at two or three lines above the eye, but without ever having produced the least degree of inflammation, or any other result than a slight degree of inconvenience in the movements of the eyebrow and forehead. After having moderately enlarged the wound, I extracted the body, which proved to be a fragment of a pane of glass. In the thigh I have seen fragments infinitely larger. A laborer, aged 25 years, was thrown from the basement story through a window, and by this means received a wound in the left thigh, for which he was taken to the hospital of La Pitié. I found the wound an inch and a half long, and upon the outer side and near the middle of the limb. I removed from it three pieces of glass, respectively of an inch, half an inch, and some lines in length. Every thing went on well until the eighteenth day, when, in pressing slightly upon the thigh of the patient, I perceived that he felt, in the neighborhood of the femoral vessels, a considerable deal

of pain, which was augmented on the least movement of the muscles. An incision there enabled me to extract from it a portion of glass *five inches* in length by about fifteen lines in breadth, together with some other small fragments of the same substance. Some dilatations afterwards became necessary, and the patient recovered. Another young man had retained in this way, for the space of seventeen days, an irregular portion of glass of an inch in diameter, and without experiencing any other inconvenience than some pricking when he was obliged to walk. The wound being cicatrized, I made an incision of two inches externally, and where this fragment had arrived, and this slight operation was followed by nothing unpleasant. The palmar surface of the fingers and the plantar surface of the foot, are frequently the seat of similar wounds. I have removed a fragment of glass more than an inch long, and three lines in breadth, which had existed in the fold of the arm for the space of seven months. A young distiller who had broken a liquor phial in his hand fifteen months before, though cured of his wounds, had never ceased to be entirely without pain. An incision of an inch in length upon the point originally wounded, enabled me, after some researches, to reach and extract a triangular fragment of glass of from five to six lines in length. I was obliged to perform the same operation, occurring from a similar accident, on a young chemist then employed at the hospital of La Pitié.

A man had, for the space of thirteen months, at the root of the thenar eminence, an imperfect cicatrix resulting from a wound caused by a piece of broken bottle. As this man scarcely suffered any and did not mistrust that any thing remained in the hand, he continued at his labors, only occasionally asking some surgical advice of the surgeons of the three or four towns where he had been. Suspecting that there was some foreign body there, I made an incision in the track of the ancient wound. The probe having confirmed me in my first idea, I enlarged the incision and succeeded in extracting a fragment of glass fourteen lines in length by two in diameter in its smallest dimensions. To explain how fragments of glass, though angular, irregular and cutting in their edges, should thus be enabled to remain in so many instances in the midst of the living tissues, without producing any reaction, is a matter of very great difficulty. All that we can say is that they are insusceptible of chemical action, or enlargement or diminution, and that being devoid of inequalities, (*rugosités*,) the glass is restricted in its action to the mechanical or physical disturbance of the parts, without irritating them or altering them in any manner whatever. As for the rest, whether it admits of explanation or not, the fact is nevertheless as stated, and as experience has a thousand times demonstrated, which makes it proper that it should be so received in practical surgery.

### § III.

Glass, moreover, is not the only substance which sometimes acts in this way in the midst of the organs.. I have seen in the midst of delicate tissues large sized and long pieces of *wood*, which caused no more disturbance than bits of glass. An adult man had been

wounded in breaking a box of black wood eighteen months before. The wound, which was between the thumb and forefinger of the left hand, soon healed. Nevertheless it reopened from time to time, and the patient suffered a little at the thenar eminence. I removed from it a piece of wood of eleven lines in length and two lines in its other diameters, resembling a nail or peg, and which had been driven in from before backwards, from the commissure of the thumb to the root of the first bone of the metacarpus, between the muscles in that region. A man employed in the service of Count Demidoff, came to the hospital of La Charité, in consequence, he said, of an abrasion which he had received from the point of a nail in breaking open the cover of a box.

The injury had occurred fifteen days before, and there was no longer any wound; but a phlegmonous erysipelas had appeared upon the fingers and almost the entire hand. Having made some incisions to give greater freedom for the escape of the pus, the parts were speedily disgorged, and the patient believed that he would soon recover. Having returned to his labors the inflammation reappeared, and he came back to the hospital at the expiration of a month and a half. Finding a spot on the anterior surface of the metacarpal bone of the middle finger more sensitive than the others, I made there a deep incision. Surprised to find the point of my bistoury arrested as if it had struck into wood, I examined the bottom of the wound, and found there a foreign body, which I immediately extracted with a strong artery forceps. What was not our astonishment in finding that this was a pliant fragment of wood fifteen lines in length! This patient, who had still some other particles of wood remaining in the hand, was ultimately cured of his wounds and inflammation; but the adhesion which took place among the different tissues and the tendons, and especially their synovial sheaths, left a stiffness and numbness in the fingers, which he will probably never get rid of. Bagieu (*Examen de plus part. de la Chir.*, etc., p. 103,) speaks of a splinter of wood 26 lines long and 8 in breadth, which had remained for two years underneath the skin below and outside of the knee, without any body having ever suspected it. A dragoon treated by Thomassin, (*Extract. des corps étrang.*, &c., p. 10,) had for the space of three weeks, without knowing it, a piece of wood in the skin 24 lines long. In the year 1838, I saw at the hospital of La Charité a man who had under the skin upon his legs a great number of indolent tubercles, which had been there twenty-five years, and which had been produced there in consequence of the explosion of a mine. Desirous of ascertaining if they were in reality foreign substances, I removed one of them which had caused considerable pain, and which was of the size of a small nut, and was situated above the internal malleolus of the left leg. This foreign body I found to be an irregular fragment of iron, which had become incorporated (combiné) as it were with the surrounding cellular tissue. A few days later, having removed a second fragment, I found that this was a portion of brownish earth, dried very hard, and also combined with the living tissues; while other portions were of the melted metal (*la fonte*) or silex. Quite a long fragment of bone driven in by the powder, was also found in the tissues.

§ IV.—*Balls,*

More perhaps than any other foreign body, may form for themselves a lodgment, and thus establish themselves in the living organs, and remain there for an indefinite period of time, without the patient's being aware of it. There are in fact some cases of this kind, where they are found at a great distance from their place of entrance. In the case of the Prince of Rohan they had ascended along the course of the tibia, and in that of Saint Mars (Dionis, *Operat.*, p. 818,) along the femur; in a child which recovered, two balls which had entered at the thigh ascended as high up as into the belly, (Blégny, *Jour. de Méd.*, t. IV., p. 78.) M. Dujaric Lasserve (*Cas de Chir.*, etc., p. 23, 1830,) in extirpating a tumor which a patient had had for a long time upon the sternum, was greatly astonished to find two balls in its centre. In the bones balls have often been found which had remained there from ten to fifteen and twenty years, without giving rise to any particular symptom. An ancient soldier who, in consequence of a gun-shot wound received twenty-five years before, had a necrosis at the lower third of the femur, with an ulcer, which from that date had opened and closed a great number of times, ultimately died of pulmonary phthisis at the hospital of La Charité in 1836. The examination of the limb in the dead body of this patient, enabled us to ascertain that he had a ball in his ham, which had worked itself a perfectly smooth and regular cavity upon the posterior border of the articular interstice. It has been laid down, therefore, as a precept from these facts, to make no dilatation (*débridement*) or any serious operation whatever, for the purpose of discovering either balls, shot, or any other foreign body whatever, so long as we have not ascertained to a degree amounting almost to certainty, the place where they have been arrested. When, however, we have ascertained in addition, that they are retained in the midst of the tissues, we may proceed in opposition to this precept, if there is no important organ that might be wounded, or if the operations deemed necessary, should in themselves present no difficulty or danger. A fragment from a grenade, as large as the hand, was extracted from the breech of an officer by Dionis, (*Op.*, D. X., p. 812.) Ravaton (*Chir. d'Armée*, p. 210,) and Bagieu (*Examen*, &c., p. 78,) have removed biscayans of from nine to twelve ounces in weight, and which had remained a long time in the tissues, causing there all sorts of disturbance. A ball imbedded in the instep, at the bottom of an abscess, was left there at the desire of the patient, and did not, it is true, prevent the wound from consolidating; but a fistula in the thigh did not close up until after Deschamps (Thomassin, p. 28,) had effected the extraction of a ball which rested upon the femur; a ball which had passed through the knee, and which was left in the ham, made it necessary to amputate, and caused the death of the patient, (*Journ. de Méd. Milit.*, t. XIV., p. 535.) Another ball on the contrary, retained between the patella and femur, after having traversed the knee from behind forwards, was extracted with entire success by Desport, (*Plaies d'Armes à feu*, p. 242.) Morand (*Opusc. de Chir.*, 2e partie, p. 252,) and Thomassin (*op. cit.*, p. 100,) have obtained similar successes in making use of the seton.

## ARTICLE III.—OPERATIVE PROCESS.

Operations required for the extraction of foreign bodies must necessarily vary from an infinity of circumstances. In most cases, the fingers, the dressing or the artery forceps, or the end of a spatula, or extremity of a probe, or the polypus forceps properly managed, will answer the purpose. But it is proper to add, that in certain cases we require instruments and operations that are more complicated.

§ I.—*Foreign Bodies retained in the Skin.*

It is rare to find any other matters implanted in the dermis except grains of powder, small shot, sand, pieces of earth or mortar. Supposing that it should be desirable to extract them, we should proceed best in doing so with the point of a pin, an ordinary needle, or a lancet, or cataract needle. It would be then necessary to scrape carefully, and as perfectly as possible, each little cup or spot on the skin with the instrument, if we desire to prevent all subsequent abnormal discoloration.

## § II.

Rugose or irregular bodies concealed underneath the skin or in the depths of the parts, require that we should first lay them bare by means of incisions of sufficient length. After that, it is advisable to seize hold of them with an erigine the same as for a tumor, and to remove by excision the cellular tissue, which it seems in most instances has become incorporated with them. Pieces of wood, scales of bone, portions of clothing, and inert concretions that have come from without, especially belong to this category. Fragments of glass, pins, needles, and all metallic bodies somewhat regular in shape, also require for their extraction an enlargement of the wound by which they entered, or that we should cut down to them in a proper manner by new incisions. As they contract no adhesions with the natural tissues, these foreign bodies should then be seized and extracted either by means of the fingers or the forceps. Being also sometimes very brittle, they moreover exact that the tractions made upon them should be managed skilfully and prudently.

## § III.

The enumeration which I have made farther back, shows that certain foreign bodies partially show themselves outside in the form of stems or plates. Thus a needle, pin, splinter of wood, or fragment of glass, the blade of a knife or sword, or a foil or ramrod, may be plunged to a greater or less depth into the tissues, while at the same projecting outside to the extent of some lines or inches. In such cases, the hand or fingers are the first instruments to be had recourse to, and they almost always suffice when the foreign body has traversed only the soft parts, and offers a sufficient purchase outside. Next to the fingers come the dressing or the artery forceps, and

lastly the blacksmith's nippers. [See under *Trephining*, Vol. II., the fortunate application of this last power in the case I have above alluded to. T.] If the foreign body has been implanted in bone, it is possible that the tractions made in this way may not be sufficient. It is in such cases that the nippers called *tricoises* in veterinary surgery, may become of great utility. Seizing the projecting portion of the foreign body, near the tissues, in the manner of a cutting pliers and without incurring the risk of too readily breaking it, they furnish the operator with an extreme degree of force. If a solid plate of wood or metal were placed on the skin around the projecting stem, the nippers would thus be furnished with a point d'appui, by which we would be enabled to succeed with them much better, and without causing so much concussion upon the organs of the patient. If by chance the surrounding body should project into some natural cavity, as in the pleura, as was seen in the case of Gérard, or the mouth, nose, vagina or rectum, it might be advantageous while making traction outside, to apply on its point a finger, armed with a thimble, so as to push it forward at the same time. This is what Gérard states that he did, and what M. Champion has also sometimes had recourse to, with the precaution of placing upon his thumb only a few transverse grooves. It is readily perceived, however, that for the mouth, vagina and rectum, the cavity of a small scoop, or small spoon, would answer full as well, and be more convenient than a thimble. The instrument of M. Charrière would become important and should be preferred where the resistance to be overcome appeared to be very considerable, and where it would be requisite to avoid all concussion in withdrawing the blade or metallic rod which had passed through the bones.

#### § IV.

Another circumstance still may present itself; it is when the foreign body implanted in the bones does not furnish a purchase either without or within the part. Then it becomes necessary to apply the *trephine* by embracing the projectile in the crown of the instrument, or we may employ the chisel, gouge, and mallet, in order to chip out at the same time the portions of bone which confine it, or at least to liberate its periphery, and enable us to seize hold of it with some kind of instrument. If the bone were not large or important, it might then be allowable to divide it on the two sides of the wound, and extsect it entire by means of any description of osteotome.

#### § V.—*Ball.*

No foreign body, in relation to the means to be employed for their extraction, has more particularly occupied the attention of surgeons, than balls. Every body knows the species of forceps called the *ball-extractor* (*tire-balle*) of *Alphonse Ferri*, and from whence have been derived almost all the litholabes of our days. The spoon-bill, the elevator, formerly so much used, and the tribulcon devised by Percy, have been introduced into surgery almost exclusively for this purpose; but the noose, (*anserine*,) concave and toothed forceps, the crow's-beak of Maggi, the cane-beak and stork's-bill, the instru-

ment of Ravaton, a mere improvement of that of Alphonse, the sheath-forceps of J. L. Petit, erroneously called Hunter's forceps, (Thomassin, p. 55,) the lizard's-beak, parrot-billed and claw-forceps, and the auger-forceps (*tarières*) mentioned by Guy de Chauliac, Paré and Fabricius ab Aquapendente, the crotchet, and an infinity of other instruments, which are figured or described in the authors I have named, are generally abandoned at the present time. We still find in Thomassin, (*Extract. des corps étrang.*, Strasbourg, 1788, pl. 1, fig. 3, 4, 5, 6, 7, 8,) the figures of three descriptions of forceps, of which one only, viz. that of the figure G, deserves to be retained. This is an instrument analogous to that of Ravaton, composed of two pieces, which are intended to glide upon each other in the manner of the pelvimeter. When opened it represents a lithotomy scoop. An effort is made to introduce it below the ball, which is then secured by forcing against it the other half of the instrument, which is straight and slightly pointed. It is rare, however, that extraction of balls cannot be effected by means of ordinary instruments or the polypus forceps. To favor the operation it is unnecessary to replace the patient in the position he had at the time of receiving the injury, unless the foreign body should appear to be less easily accessible by any other mode. Most usually it is advantageous to enlarge the opening by which the ball has entered, and consequently to make some incisions. If there should be but one opening, this is the one to be dilated. If, however, the ball should be found at a great distance, and that in order to fall directly upon it, it would only be necessary to divide a few layers that were neither very thick or important, we should not meddle with the first wound, but proceed to make a counter-opening. When once laid bare, we endeavor to force it out by enucleation, or by means of the finger, or a spatula, scoop, or spoon-bill. Supposing it should have existed a long time in the tissues, and had become enveloped in them, it would be better to remove its cyst with it than attempt to disengage it from that. I have stated, in speaking of balls introduced between the ribs, how we should, under such circumstances, proceed in removing them. It is scarcely but for balls that have become actually encrusted or imprisoned in the body of bones, that there can be a call for the trephine, or for some of the forms of exsection. Thus in the cranium, os calcis, olecranon, body of the tibia, condyles of the femur, and great trochanter, the extraction of the ball might require the division of the bone itself, and consequently become the occasion for the use of the trephine or for exsection. The most simple mode then is to include the ball within the crown of the trephine, so as to remove it with the osseous disc. If this process were not applicable, it would be necessary to apply the instrument to the neighborhood of the ball, in order that a chisel inserted in the hole might reach underneath the foreign body, and thus cause its expulsion. It is readily understood that by means of the chisel, gouge and mallet, we should succeed equally well in bones of a certain size, those of the limbs, for example, but that there would be some danger in making use of those instruments to the cranium. If the trephine should not appear to be very suitable, it would still be practicable to have recourse to the concave rowels of M. Martin, or the osteotoime of M. Heine or M. Charrière, after

the rules laid down in the chapter on *Exsections*. It is moreover well understood, that during these operations we ought, by all the means known, put ourselves on our guard against wounding the vessels, nerves, tendons, articulations, and in fact all the important organs; and that, whether at the moment of the operation or afterwards, we should prepare ourselves against every kind of danger or accident that might occur, the same as we would for any other operation of a somewhat serious character.

#### ARTICLE IV.—FOREIGN BODIES IN THE ARTICULATIONS.

Among the foreign bodies which become established in the centre itself of the organs, I design to say one word only of those of the articulations. It is not of fragments of fungosities, fractured bones, diseased cartilages, or particles detached from the neighboring surfaces and become free in the joint, in consequence of a malady still existing, that I wish to speak upon the present occasion, but of those bodies known under the name of *free cartilages*, [loose] in the articulations; bodies of which I have pointed out the origin, symptoms and danger in another work; (*Dict. des Sc. Méd.*, 2e edit., t. IV., p. 179.) It is in the ginglymoid articulations that they have been most frequently encountered. Morgagni, according to Boyer, had seen many of them in the tibio-tarsal articulation. Haller states that he found *twenty* in the temporo-maxillary articulation. An elbow examined by M. Robert, contained eighteen or twenty; and M. Malgaigne states that he found nearly *sixty* in another humero-cubital articulation. It is in the knee, nevertheless, that they are almost exclusively found. Paré, Pechlin, Henkel, Simson, Hewitt, Ford, Bromfield, Théden and Desault are the authors who have more particularly drawn public attention to this subject. The size of these bodies is exceedingly variable. The one mentioned in the case of Pechlin was of the size of the finger, while that in the patient of Paré had the volume of an almond. I saw one removed from the knee, in 1822, which might have been taken for a flattened chestnut, [meaning the *marron* or large chestnuts of France, which are treble the size of our American chestnut. T.] A man admitted into the hospital of Saint Antoine in 1829, had one which was yet larger than that by one half. Sometimes, however, they scarcely exceed the size of a barley seed. When there is but one only, it is generally of large size; when numerous, on the contrary, they are almost always diminutive. Some are hard and, as it were, stony; others bear so strong a resemblance to fragments of cartilage that it is difficult at first to distinguish them from this last. M. Bourse, a physician in the environs of Paris, sent me one in 1834 for the Royal Academy of Medicine, which, to all appearance, was only a fragment of the external condyle of the tibia still invested with its cartilage. They have ordinarily less consistence, and may almost always be crushed under a certain degree of pressure. They contain neither vessels nor laminæ, and present no appearance of texture. Whether loose or not they have an unctuous aspect, which has made some suppose they had a synovial envelope. Their centre is usually the part that has least consistence, and desiccation considerably dimin-

ishes their dimensions. Being truly foreign bodies they are, in my opinion, simple concretions, whether fibrinous or lymphatic, or morbid sanguineous productions. These cartilages when they have once become smooth and unctuous, do not seem to be of a nature to disappear spontaneously. We can conceive only that they may become attached, engrafted or concealed in some region or some recess of the articulation, where they are sheltered from every kind of pressure and displacement for the future. It is thus that certain patients, after having been more or less tormented by them, have suffered no more and believed themselves cured. Other persons, again, are so little incommoded by them, that they scarcely think of them. A young lady of Arras, who consulted me in 1832, had had one in the knee for ten years, and suffered only when through accident she hit it against some other body. I saw in 1830, at the hospital of Saint Antoine, a man of from fifty to sixty years of age who had never been troubled by one that he had had in the knee for more than twenty years. But the great majority of patients unfortunately have not the same good luck. Besides the pain that the least unsteady movement may re-excite, they have, moreover, to fear in the sequel that the joint may become altered, as in the patient of M. Knox, or that it may become attacked by either acute or chronic inflammation; whence comes the necessity of considering the operations that possess the power of effecting a cure. Various means have been proposed for this purpose. Extirpation is the first which has presented itself to the minds of practitioners; but experience having soon demonstrated its dangers, it has been necessary to devise others. Compression in fact is the only resource that can be advantageously substituted for it in certain cases. Whether by fixing the body at a determinate point external to the articulating surfaces, it places it out of the possibility of being injured, or whether it acts by promoting its solution and absorption, certain it is that many patients have experienced great relief from it. Middleton obtained undoubted successes from it. Gooch also says he has had much reason to be satisfied with it. The same is remarked by Hey, who gives many examples, and who made use of a laced knee-cap (*genouillère*). Boyer in two or three cases was equally fortunate. When we have decided upon making use of it, it is important above all, to compel the cartilage to recede into a pouch (*cul de sac*) of the capsule, on the sides of or above the patella, for example, if it is in the knee, in order that by fixing it there we may maintain it there firmly, without having need of any very great degree of constriction. The bandage or knee-cap, moreover, should be disposed in such manner, that the patient may not be impeded in walking. We would not have recourse to absolute rest, nor an apparatus for preventing any movement in the joint, unless the first method had been used for a long time and failed. Its use, moreover, is very inconvenient; the more so inasmuch as it acts at first only as a palliative, and that it is often necessary to continue it for a number of years before a radical cure is effected. Also, it frequently fails entirely. Raymarus had seen its inefficacy in the hospitals of London.

M. Averill has given the case of a patient in whom M. Ballingall

had used it without any advantage, and a great number of practitioners have related similar failures. Their extraction is an operation so simple and easy in appearance, and so prompt, that it seems astonishing at first that compression should be preferred to it; but the surprise ceases the moment we reflect that it exposes to the same dangers as wounds penetrating into the articulations. A patient operated upon by Hewitt, and whose case is given by Raymarus, died in consequence of it. That of Simpson created the greatest degree of anxiety for several months. M. S. Cooper cites two other cases that perished from this cause. An example also is given in the cases of M. Kirby, which is calculated to inspire serious apprehensions. A young girl, whom I saw operated upon in 1822, was seized with symptoms so formidable, that her recovery attended with an ankylosis seemed in some degree to be miraculous. M. Richerand states that out of twelve operated upon by him, four died; two mentioned by M. Decaisne (*Encyclogr. des Sc. Méd.—Bulletin Belge*, 1836, p. 102) also succumbed. Bell, on the strength of facts of this kind to which he had been witness, goes so far in such instances as to express a preference for amputation of the leg, unless the cartilage should appear to be very superficial. David, cited by M. Ledo, confines himself to an ankylosis which he recommends should be artificially produced. Bromfield, Cruikshank and Boyer express nearly the same apprehensions. It nevertheless appears to me that the danger of this operation has been exaggerated. Ford, Hunter and Desault have performed it sufficiently often without its being followed by any unpleasant results.

Numerous cases of a successful issue have been collected in the theses of M. Champigny and M. Ledo. M. Larrey, J. Clarck, M. J. Coley, M. Brodie, M. Allan, MM. Muller, Soender and a multitude of others have also furnished similar examples. Aumont (*Archiv. Gén. de Méd.*, t. II., pp. 412, 472,) removed four of these bodies at two different occasions, with an interval of forty days, without causing the least accident. Most frequently, in fact, the cure is exceedingly prompt; and many patients have had it in their power to walk and resume their usual occupations at the expiration of six or eight days. So great a difference in the results is however readily explained. If it is possible to obtain immediate reunion of the wound and no inflammation take place under it, the whole matter is reduced to one of the most simple solutions of continuity. On the contrary, as soon as inflammation attacks the synovial and the interior of the joint, there is every thing to apprehend, and the danger of the disease cannot be dissembled. We should not therefore operate until after having duly weighed all these different circumstances, and forewarned the patient or some of his friends of the risks to which he will be exposed. The following is the rule which prudence, in my opinion, prescribes in such cases. So long as the cartilage produces but slight inconvenience we should endeavor to persuade the patient to support it; if it really causes disturbance in the functions of the joint, compression is then indicated. When it does not yield to the bandaging, or that the dressings used cause too much inconvenience, it is then time to think of its extraction. We should not however decide upon this step when the cartilage is concealed deep

within the joint or too difficult to be reached from without, unless it shall have produced unpleasant accidents, and after having in vain made trial of the other means. In such cases then when the cartilage, on the other hand, is very much diseased, and that it may be easily fixed without the articular interline and near the skin, the operation has every prospect of success. Many surgeons apprehending the introduction of air into the capsule, have suggested that we cannot take too much precaution on this point. Also to prevent the parallelism of the wound of the synovial and that of the integuments, they have carefully endeavored to draw the skin sometimes upwards, after Bell, at other times downwards, according to Bromfield, and in some instances to the side, as recommended by Desault and Abernethy.

What I have said of the action of the air, in speaking of articular wounds, (*Dict. de Méd.*, art. *Articulation*—see also M. Velpeau's opinions and those of other surgeons on this matter in our abridged account of the *Discussion on Tenotomy*, at Paris, in our notes of Vol. I. of this work,) renders it unnecessary for me to discuss here the value of these precautions. The only precaution which really deserves to be retained, is that which consists in conducting the body to be extracted as far as possible from the centre of the articulation, and to a point where there is the least amount of important parts to be divided. Being once brought there, it is firmly held between two of the fingers, or better still, as recommended by M. Averill, by means of a metallic ring, so as to stretch the skin uniformly, as advised by Simson, Theden, Vielle, &c., and in order that it may not escape under the action of the instrument and re-enter the capsule we have just opened. As for the rest, the most rapid and neat incision is evidently the best. For example, it is advisable to make it fall perpendicularly upon the foreign body, and to give to it at once an extent proportioned to the size of the morbid concretion. If the cartilage does not emerge by pressure in the manner of a kernel out of its fruit, we immediately seize it with a forceps, hook or erigne, and with one cut of the scissors divide the pedicle if it has any. The wound being brought together with adhesive plaster, the most perfect repose is recommended up to the time of its complete cicatrization. We might also, for greater security, apply to the whole of the joint exact but moderate compression, and keep the dressings wet with cold water during four or five days. As the accidents, after all, which may supervene, belong to arthritis complicated with wounds, we have no need of occupying ourselves with them any further. I will only call to mind that the disease is very liable to return, and that we must take care not to pronounce too sanguinely on this point.

## TITLE FOURTH.

## SPECIAL OPERATIONS.

## PART FIRST.

## OPERATIONS WHICH ARE PERFORMED ON THE HEAD.

## CHAPTER I.

## THE CRANIUM.

## ARTICLE I.—FUNGOUS TUMORS.

DEGENERESCES of the dura mater almost always exhibit themselves under the form of tumors. These tumors, united under the title of fungous tumors since the time of Louis, are nevertheless sufficiently varied in their nature; there have, moreover, been associated with them a certain number of bodies which are altogether independent of the dura mater. The case mentioned by Hébréard (*Bull. de la Fac.*, t. V.) was a species of cyst, filled with pultaceous matter, and lodged in the left middle lobe of the brain, and which had only subsequently invaded the dura mater. In the same way, also, certain cases related by Abernethy (*Surg. Obs.*, vol. II., p. 51, 54,) seem to belong to degenerations of the brain, rather than to those of the dura mater. The confusion in this respect is so great, that we find comprised under the same title, fibrous, scirrhous, and hematic tumors, encephaloid masses, and various vegetations and fungosities which project from underneath the integuments of the cranium, whether they have had their primitive seat in the dura mater, the substance of the bones, or in the brain itself.

§ I.—*Fibrous Tumors.*

Though rarely found there, masses of a purely fibrous character are, nevertheless, sometimes encountered in the cranium. M. Senn (Espinosa, *Thèse*, No. 129, Paris, 1825) appears to have met with an example. In that which was exhibited to the Academy of Medicine in 1825, (*Archiv. Gén. de Méd.*, t. XIII., p. 121,) the tumor was of the size of an egg, occupied the base of the cranium posteriorly and to the right, had depressed the corresponding lobes of the brain, and had not been revealed by any symptom during life. As these tumors do not appear to have been yet seen except on the outer surface of the dura mater, it would have been interesting to know if the fibrous productions noticed by M. Del Greco (*Arch. Gén.*, t. XXIII., p. 432) in the pterygo-maxillary fissure, or the nasal fossæ,

and by M. Rayer in the zygomatic fossa, in a woman who died at La Charité, in December, 1834, might not be classed in this category.

### § II.—*Hematic Tumors.*

The blood which has been effused into the diploe, or between the dura mater and the bones, between the dura mater and brain, or into the most superficial layers of the brain itself, may undergo various kinds of degeneration, and assume the form of tumors that might be denominated hematic. Some facts related by Abernethy come to the support of this supposition. In the case of a man 40 years of age, who had been struck violently by a stone, and who had in consequence thereof a species of cerebral hernia, the tumor was found to be similar to coagulated blood. (Abernethy, *Op. cit.*, vol. II., p. 51.) The same author speaks of a carpenter who was trephined for a depression of the parietal bone, and who, on the twelfth day from the operation, had a sort of cerebral hernia, the tumor in which case also appeared to have been formed from blood extravasated into the substance of the brain. From these facts, Abernethy moreover concludes, that what has been described under the name of cerebral hernia, is sometimes formed by blood, and that it is the same with certain fungous tumors of the dura mater. A fungus developed in the head of the tibia, and which he also compares to coagulated blood, also what I have said of contusions, and what I have often since remarked, (*Thèse sur les Contusions*, 1833,) serve but to corroborate this view of the subject. We could thus explain the appearance of tumors, which it seems difficult to range under cancers, and whose origin in reality appears to be ascribable to some external violence.

### § III.—*Phlegmasian (phlegmasiques) vegetations.*

Wounds of the head, fractures of the cranium and trephining have been frequently followed by fungosities and vegetations upon the dura mater, in such a way that Louis especially was led to confound these productions with true fungus. When they have been preceded by a protracted suppuration, and that the surface which supports them has become exposed to the air, it is difficult to say in what such fungosities differ from those which are so frequently found at the bottom of external wounds. In other cases, on the contrary, they probably result from some extravasation of concretable lymph, or from fibrine, and sometimes also from sanguineous morbid layers which have ultimately become organized. I have elsewhere (*Plaies de Tête*, 1834) published some facts of this kind. Perhaps also, the following case which I find in Abernethy, (*Op. cit.*, p. 106,) belongs to the same description. A man from thirty to forty years of age was afflicted with violent pains in the head, in consequence of a *severe salivation*; he was trephined and *pus was found under the bones*, and the dura mater, which was greatly thickened, was covered with a *soft and reddish substance*.

### § IV.—*Fungus.*

All, or nearly all the other tumors of the dura mater are cancers.

Almost all those that have been described, were evidently composed of encephaloid matter. The one which Paré (liv. XII., chap. 23) mistook for an aneurism, was formed from the *brain*. The patient mentioned by Rey (*Acad. de Chir.*, t. V., p. 22) had at the same time, a cancer in the thigh, or the *femur vegetated* (*carnifié*.) In that of Philippe, (*ib.*, p. 36,) the bones of the cranium were also vegetated (*carnifiés*.) In a case cited by M. Chelius, (*Arch. Gén. de Méd.*, t. XXVIII., p. 422,) the substance of the tumor resembled *marrow*; and how is it possible not to recognize a cerebriform fungus in the encephaloid (*venteuse*) tumor, described at such length by Lecat, (*Soc. de Santé de Lyon*, 1798, p. 31)? The production was also of an encephaloid character in the two lunatics, noticed by M. Blandin, (Espinosa, *Thèse*, No. 129, Paris, 1825,) also in the case mentioned by M. Deneux, (*ib.*, p. 9,) the child eight years of age, spoken of by M. Marjolin, (*Dict. de Méd.*, 1<sup>e</sup> edit., t. IX., p. 305,) and in the case referred to by M. Bouvier, (*Bibl. Méd.*, 1825; or Espinosa, *Op. cit.* p. 10.) The tumor removed by M. A. Bérard (*Gaz. Méd.*, 1833, p. 735) was also an encephaloid mass; and in the patient of Siebold, (*Journ. Compl.*, t. XXXIV., p. 304,) and who died under the operation, it was a cavernous substance. Schindler also says (*ib.* p. 325) that cerebroid matter was found in a tumor of this kind in an aged woman, and M. Ebermayer (*Arch. Gén. de Méd.*, t. XXII., p. 229) states the same thing of a young girl aged four years. I could say the same thing of a lady seventy-one years of age, whom I saw with M. Durand, and also of a case communicated to me by A. Lauth. M. Cruveilhier also, who describes and has given the figures, (*Anat. Path.*, 8<sup>e</sup> livr.) six cases of fungous tumors of the dura mater, speaks only of encephaloid tissue. Scirrhous tissue, however, may also form its base. A woman, whose case I published in 1825, had two tumors of this last description, which I showed at the time to the Professors of the Faculty of medicine, and which I have for a long time preserved in alcohol. Whether encephaloïdal or scirrhous, these tumors nevertheless differ in a remarkable manner, in respect to the parts of the membrane upon which they are situated. Out of fifty-one examples where this location was given, I found thirteen in the parietal regions, eight in the temporal, seven in the frontal, seven in the orbito-nasal, seven in the occiput, five in the vertex, three on the petrous bone, and one in the substance of the falx of the brain. I have, in two cases, seen them protrude from the ear, and once through the pharynx. All ages are liable to it. The following is the proportion in this respect, which was found in forty cases: From birth to ten years, six cases; from twenty to thirty, seven; from thirty to forty, ten; from forty to fifty, nine; from fifty to sixty, five; and from sixty to eighty, three cases: from whence it follows, as had been remarked by Boyer, (*Malad. Chir.*, t. V., p. 186,) that they are, notwithstanding, more frequent between the ages of thirty and fifty years, than at any other period of life. As to the sexes, I notice that in forty-four cases, twenty-three were men and twenty-one women. The legitimate *fungi* of the cranium are in their nature incurable. Those tumors which seemed to be formed by effused blood, like those examples given by Camérarius and Abernethy, (Ebermayer, *Journ. Compl.*, t. XXXIV., p. 301,) those which result from

syphilitic disease, and whose character is not decidedly cancerous, may alone leave some hope of cure. The prognosis for all the others, as has been remarked by Delpach, ought to be the same as for cancers of the most serious description. Moreover, these tumors sometimes are exceedingly slow in their progress. The patient of M. Graefe (*Arch. Gén.*, t. XVIII., p. 421) suffered for *thirty-seven years* and then died. The child mentioned by Schindler in the same way, lived over *five years*, (*Journ. Compl.*, t. XXXIV., p. 320.) Death did not take place until at the expiration of forty-five years, in the woman whom Robin (Louis, p. 18) caused to be exhumated five years subsequently; not until after thirty years in one of the patients of Voisin; (Thibault, *Thèse*, No. 133, Paris, 1816;) after ten years in another, and after fifteen years in a case extracted from the English Journals. (*Journ. Gén.*, Avril, 1814.) Also, it is less by hemorrhages, destruction of the tissues or extension of the degenerescence, that these tumors cause death, than by cerebral accidents which ultimately supervene.

In at least twenty cases out of fifty these accidents have been brought about by attempts at operations. These accidents consist of convulsions, delirium, symptoms of compression of the brain in fine, or of inflammation of the meninges. Sometimes also, as I have seen in the case of a woman, they are reduced to symptoms of debility, soon followed by hebetude, afterwards partial or general, or incomplete or complete paralysis, and a continual desire for repose or even for sleep. This state may be maintained for many months, gradually becoming aggravated. The patients then ordinarily expire without spasms, and so to speak, imperceptibly. In this last case death almost always happens by compression. Upon the opening of the dead body it is seen that the tumor has augmented in growth within, either in breadth or depth (*épaisseur*) so as to react with more or less degree of force upon the mass of the brain. If on the contrary the patients sink rapidly, we find the dura mater, or the surface of the brain inflamed and covered with pus, as though it were ulcerated or had undergone ramollissement, or been reduced to a state of putrilage (putrilage.) Small apoplectic cells (*épanchements apoplectiques*) are also sometimes remarked in the substance of the hemispheres themselves, and it is not unfrequent to find the purulent infiltration of the arachnoid extending itself as far as the occipital foramen and around the spinal marrow.

A. *Treatment.*—The disappearance of a fungus of the dura mater by resolution or suppuration has never been noticed; therefore, the plasters, pomades, unguents, and other topical applications proposed or made trial of, with a view of obtaining one or the other of these terminations, must be absolutely proscribed. Nor does the compression of the tumor appear to possess any more curative power; it is allowable only in the character of a palliative, and even then cannot be made use of but in a very small number of cases. The destruction of the fungus, whether by caustics, the ligature, or the knife, is in reality the only medication which merits consideration. Exirpation itself, the only remedy which reason sanctions the employment of, appears to have been but very rarely followed by success. In fact the external tumor is often only the smallest portion of the evil. After having removed it, we soon see it reproduced, if in fact new tu-

mors do not also appear. In this respect they have that feature in common with cancerous tumors in all other parts of the body. But not being enabled to make their way outwards, except through an osseous opening, it is not possible, as in the last, to designate their limits beforehand. I cannot perceive, however, why we should not attempt to extract them, when there is every reason to believe that they are clearly circumscribed, and that the disease is altogether local. In a woman who had been cured of cancer of the breast and who died of a pleurisy at the hospital of the School of Medicine in 1824, a scirrhus of the size of a small pullet's egg, commencing at the dura mater, had traversed the bottom of the right inferior occipital fossa, made a slight projection under the splenius muscle, and was found to be so regularly circumscribed, that it certainly would have been possible to have removed it entire, if its existence had been suspected during the life of the patient. The operation might be made trial of, at least for the fungous tumors of new-born infants, to which M. Nægelé has been one of the first to endeavor to draw the attention of practitioners, and also upon those which Abernethy derives from certain degenerated sanguineous or lymphatic concretions. Five out of the six cases in which caustics were employed perished. The individual mentioned by Cattier, (*Obs. de Méd.*, p. 48, obs. 15,) and who was treated by caustics against the advice of Pimpernelle, who advised the trephine, also died; it is also probable that that of M. Eck, (Ebermayer, *Jour. Compl.*, t. XXXIV., p. 323,) the only one which was cured, had only a simple hematic tumor. It is equally doubtful if M. Ficker, (*Ib.*, p. 320,) had to do with cancer, in the case of partial success, which he relates, with the ligature. As to extirpation, it has not, up to the present time, produced but very uncertain results. Franco says, (*Tr. des Hernies*, p. 485, An 1561,) "I saw a child who had a fungus tumor which two of us wished to extract, (tirer.) Nevertheless I was somewhat deterred, [je fus aucunement refrody—ancient French, T.] perceiving that the cure appeared to be difficult and not what it seemed to be (non tant qu'elle l'estoit); at the expiration of some days, my companion alone undertook it, when he found it within the brain itself, which was followed by the death of the patient. It is therefore very necessary to reflect and to ascertain (taster) if the brain is or is not entire." A patient mentioned by Camérarius (*Ephém.*, c. n. dec. 2, obs. 99, an. 8) also died from this cause. Amatus, (Cent. 5, obs. 8,) Schmucker (*Bibl. Chir. du Nord*, p. 10,) and Rossi, (*Med. Op.*, t. II., p. 261,) relate similar instances. It is necessary also to concede that it has scarcely ever been successful. In one of the cases of M. Walther, (tom. XXXIV., p. 314,) he was prevented from finishing the operation by a hemorrhage which made it necessary to apply the ligature to ten arteries; in a case mentioned by Klein, puncture was had recourse to, and then an incision. M. Ebermayer, (*Archiv. Gén. de Méd.*, t. XXII., p. 229,) in the case of a child of four years, whose history he gives, mentions only a single cut of the lancet. Nor was there any other treatment than incisions made use of in the patient of Sivert, who nevertheless died two days after.

In the case of Rey, (Louis, p. 22,) the tumor was only laid bare without removing it. The patient of Courtavoz and Chopart, (*Mém. de l'Acad.*, t. V., p. 28,) died on the following day, though here

also incisions only were made use of. A similar attempt was followed by the same results in the case of Philippe, (*Ibid.*, p. 36.) Nor was the excision complete in the case of Saltzmann, (*Ibid.*, p. 30, or *Mém. de Saint Petersburg*, t. III., p. 275.) The same was the case in the patient of M. Graefe, (*Arch. Gén. de Méd.*, t. XVIII., p. 421;) which however did not prevent the wound from cicatrizing, nor life from being prolonged to the period of seven months. The same should be said of the new-born infant, mentioned by Schneider, (Ebermayer, *Journ. Compl.* t. XXXIV., p. 320,) since it became necessary to repeat the operation at the expiration of five years, at which time it proved fatal. Nor could Siebold in his case complete the extirpation of the tumor, for the patient died under his hands. In remarking that he removed all *that he could*, M. Orioli, (*Gaz. Méd.*, 1834, p. 410,) leaves it quite apparent that the disease had not been effectually destroyed in his patient, when gangrene came, so to speak, to complete his operation. Reasoning moreover, would have sufficed to demonstrate what experience has now placed beyond all doubt, to wit: that such attempts were calculated but to augment the danger of an evil, already so formidable and insidious in itself. Such facts, therefore, are not to be taken into the account, when we undertake to determine the value of the operation of extirpation for fungus of the cranium. The small number of cases where the operation has been effectually accomplished, furnish results somewhat less alarming. The Spaniard that M. A. Severin (*Journ. Compl.*, t. XXXIV., p. 300,) states that he cured, could have been so only by the trephine. The same must be said of the patient of Grosmann, (Stoltz, *Thèses de Haller*, 1708, presid. de Sand.) M. Eck says he succeeded without trephining; but he employed caustics after extirpation. I have already remarked that the success of M. Orioli was as much owing to the gangrene as to extirpation. M. Klein twice cured the same patient with an interval of a year, by means of the trephine and extirpation; but he believes the glands of Pacchioni were the seat of the fungus. In another patient the same operation was followed by death, (*Arch. Gén. de Méd.*, t. XXII., p. 225.) In the case related by Volprecht, (Louis, p. 31,) the trephine was applied around the tumor; but this last was not removed, and the autopsy showed that other fungi existed in the cranium. A meningitis caused the death of the patient that Dupuytren had operated upon, (Denonvilliers, *Thèse*, 1789, p. 76,) by embracing the whole tumor in a large crown of a trephine. The patient operated upon by M. Bérard, also it is true died, but it had been rendered necessary to apply sixteen crowns of the trephine, and to remove a portion of the longitudinal sinus. M. Pecchioli, in operating upon a man 46 years of age, (*Gaz. Méd.*, 1838, p. 414,) who had a fungous tumor to the right of the sinciput, succeeded perfectly by means of three crowns of the trephine, and by removing a portion of the dura mater. I perceive that M. Syme, (*Edinb. Med. and Surg. Journal*, vol. CXXXVII., p. 384,) going as far down as to the dura mater for a large fungous tumor of the cranium, cured his patient also. If it were proved that the tumor attacked was almost never solitary, these few successes perhaps would not be sufficient to justify the operation of which we are now speaking; but it is to-day demonstrated by the

patient of Pohlius, by that of M. Bérard and by many others, that fungus of the dura mater, like cancer of the breast, is at first quite frequently uncomplicated (unique); nor do I hesitate to say that extirpation is indicated at the cranium as in any other region, and that there it presents the same counter-indications as for other cancers. It must, however, be admitted, that in itself the ablation of deep-seated cancers of the cranium is infinitely more dangerous than in any other region of the body, and that these dangers, taken in connection with the unfortunate prognosis which naturally belongs to the disease, are calculated to make us exceedingly circumspect in such cases.

B. *Operative Process.*—If however it should be decided upon, it would be necessary, while taking care to cut the flaps in the sound parts, to preserve as much of the cranial teguments as possible. Crowns of the trephine should then be applied all around the tumor, and the intermediate osseous angles forthwith destroyed by a saw made expressly for this purpose (*ad hoc*), or by means of the chisel and leaden mallet. If the tumor should be situated in the bones only, the surgeon would remove it immediately without incising the dura mater. In the contrary case we should not hesitate to cut round the entire morbid growth, including moreover in the circle a sound margin of the dura mater. Having arrived at this stage of the operation, we ought even to penetrate still deeper if the tumor should be found to have its origin between the pia mater and the brain.

In cases of very large fungus, perhaps it would be advisable to perform the operation at two periods, at an interval of from twenty-four to forty-eight hours, to apply but half the crowns of the trephine on the first day, for example, as M. A. Bérard did, and not to complete the perforation of the bones until the day after, or the day after that, and immediately previous to the extirpation of the tumor. A woman recovered in this way after having sustained the application of fifty-two crowns of the trephine, for a large necrosis of the cranium, accompanied with caries, (*Méhée de la Touche, Plaies de la Tête.*) As it is not possible in such cases to unite the wound by first intention, a piece of linen spread with cerate, and perforated with holes, should be extended over the entire solution of continuity. Balls and then gateaux of lint should be applied over this, and kept in place by means of a suitable bandage, so as to fill up the void which has been made in the cranium, and make moderate pressure upon the brain. This last precaution is of the highest importance when we have been forced to excise the dura mater. The patient of M. Bérard, who during the operation had experienced no inconvenience in this respect, swooned away as soon as the tumor with its flap of membrane had been entirely extirpated, and did not come to until after the compression which they had the presence of mind immediately to make, at the place where the parts had just been detached. It cannot be denied also that the sudden abstraction of an abnormal pressure which may have been considerable in its amount, and existed in many cases for several years, must necessarily expose to serious accident in regard to the brain. Extirpation, therefore, of cancers of the cranium, in my opinion, presents but few chances of a favorable issue when the disease proceeds from the pia mater, or where we have to destroy only a somewhat extensive portion of the

dura mater. Consequently then it is for the tumors only with a narrow base, and for such as do not render it necessary to remove anything but the bones, that this operation is in reality admissible. The rest of the manual and its consequences, moreover, are too analogous to those of the trephine, to require that I should say any more on this subject in the present article.

### ARTICLE II.—ENCEPHALOCELE.

There is no resource for hernias of the cerebrum and cerebellum but that of making the patient wear a bandage furnished with an elastic pelote properly adjusted. Every kind of bloody operation would be dangerous and probably cause death, as in the case that Lallemand has published, and in that of M. Baffos. Many surgeons, however, have ventured upon its excision. These excrescences from the brain, so frequent in traumatic phlegmasias, and those that follow openings into the cranium, and which M. Champion denominates *hypercephalose*, which Gall considers as the unfoldings of the convolutions, and upon which Langius has written very learnedly, (Epist. 6, liv. I.—Bonet, *Corps de Méd.*, t. III., p. 173,) are attributed by Arne-mann (*Gaz. Sal.*, 1787, No. 59, p. 2,) to the expansion of the anterior ventricle of the brain. It succeeded to a fracture in the case of Tulpius (Bonet, *Corps de Méd.*, t. IV., p. 37, obs. 54,) and in that of Las-sus (*Méd. Op.*, t. II., p. 273.) Diemerbroeck (*Anat.*, t. II., p. 235, liv. III., ch. 5,) speaks of one which detached itself several times, and which resulted in death. In the case of Tudecius (Planque, t. XXVII., p. 87,) the cause was the presence of a foreign body, viz., the blunt point of a halberd. In a case where the hypercephalose protruded through the opening made by the trephine, F. de Hilden (Bonet, t. II., p. 374,) states that Bourg had extected it with success. According to Henry Pætrus (Bonet, *Corps de Méd.*, t. IV., p. 49, obs. 73,) extirpation was also performed by Rhodius. The excision of a tumor of this kind, put a stop to the serious accidents it had occasioned in a case related by Trioen and Ravaton, (*Prat. Mod. de la Chir.*, t. I., p. 222, 225,) who advises that they should be extirpated as far forward as possible, (le plus avant possible,) and has often performed this operation without accidents: the pulse after it rose and the head became more free, [i. e. less or rather not at all oppressed any longer by the tumor, T.] Tétu (*Mém. de Méd. Chir. et Pharm. Milit.*, t. XIV., p. 33, et 39,) after having performed excision, had recourse to compression with success. Deidier (*Encyclop. Méth. Méd.*, p. 252, col. 2,) in a case excised many excrescences from an encephalocele without causing pain. It is nevertheless true, that apart from some rare exceptions, I should prefer with Rossi (*Elém. de Méd. Oper.*, t. II., p. 240,) to restrain these tumors by means of plates, or by any kind of compression whatever, rather than attack them with the cutting instrument.

### ARTICLE III.—MELICEROMA,\* (MELIÉCRIS.)

Many persons will carry during their whole life, under the hairy

\* [The Greek coinage of this word is we deem perfectly justifiable, to harmonize with steatoma, atheroma, lipoma, &c. T]

scalp, steatomatosus, atheromatous, or meliceromatous tumors, without being sensibly inconvenienced by them or even attempting to do any thing to get rid of them. Others suffer more or less from them and for some reason or another desire at any hazard to be disengaged from them.

The nature and formation of these *loupes*, still imperfectly understood, appear, in my opinion, to require further researches. There are some of them which, at their beginning, exhibit themselves under the aspect of a small, hard, yellowish, friable, unorganized mass, similar to collections of fibrine, or blood deprived of its coloring matter and serous portion. Increasing in growth, they begin by becoming soft at the centre, and are thus transformed into a cyst, which is so much the thicker in proportion as the tumor is less ancient or of less volume; a cyst which is filled with grumulous substances, in a greater or less state of fluidity, and which resemble neither pus nor fat. Should we not ascribe their origin to some of the elements of effused blood? It is at least certain that they are not distended cutaneous follicles, as is asserted by Béclard and M. A. Cooper. Their cyst, which is thicker in proportion to their less degree of development, is always independent of the skin. A tumor twice the size of the head, and which perhaps was only an atheromatous cyst, though the author describes it under the title of lipoma, was removed with perfect success by M. Pl. Portal, from the forehead of a child of four years of age, (*Clin. Chir.*, p. 279.) Sebaceous, serous and other kinds of cysts, lipomas and fibrous tumors, are to be treated at the cranium as in any other part of the body. I have seen sub-cutaneous encephaloid cancers in many individuals, an erectile conical tumor of an inch in length, with a thick pedicle, in a young Moldavian of twenty-four years of age, and melanotic plates of sufficient size in three or four cases. There might be cases where the ligature would suffice to detach them, as in a case related by Boyer, but it is rare they are strangulated at their base. M. Bertrand, (*Arch. Gén. de Méd.*, t. XX., p. 285,) states that he cured one by passing through it a *long needle*, which he kept there in the manner of a seton. Demours, who placed two needles crosswise instead of one, asserts that he thereby obtained successful results. But the cutting instrument here is infinitely better, and ought always to be preferred.

*Operative Process.*—When the tumor is of great size, and the skin much attenuated, an *elliptical flap* of integuments should be removed with the cyst. Two semilunar incisions are then first made. A transverse incision is then made from each lip of the wound, and prolonged outwardly, so as to circumscribe four flaps, which being raised up with care, enable us to remove the loupe entire and without difficulty. In most cases these two last incisions may be dispensed with. While the surgeon, with an erigne or good pair of forceps, draws on the cyst with one hand, he dissects with the other, by means of the point of the bistoury, its external surface, and thus readily succeeds in separating it from the surrounding tissues. In the ordinary process, and where it is unnecessary to sacrifice any part of the skin, it is recommended to make a simple *crucial* or T incision, and to take every possible precaution not to open into the cyst while dissecting the flaps of the wound, which latter is to be united by first intention,

after having extirpated the tumor. M. A. Cooper adopts another course. He first opens freely into the tumor, empties it by compressing it with the thumb and forefinger; then seizes the cyst on one side by the hook or forceps, and dissects and removes it. The incision being made in such manner as to leave intact the posterior wall of the meliceromatous pouch, M. J. Cloquet immediately seizes with a forceps its anterior wall under the right lip of the wound, draws upon it in proportion as he divides the adhesions, which are ordinarily very feeble, and thus effects, to some extent, by a single stroke, the enucleation of the whole cyst. I have, on more than one occasion, confined myself to dividing the integuments only, and then seizing the tumor at the bottom of the wound with a strong ergine, after which it becomes easy to dissect and remove it. By these three variations of the *process of simple incision*, the operation is much more prompt and less intricate than by the ordinary process. After the removal of the sac, the borders of the wound, so to speak, replace themselves in contact, and reunion is generally accomplished in the space of a few days. M. Tealier, (*Transact. Méd.*, t. II., p. 430,) who, after a simple incision, confines himself to making traction on the sac in order to extract it; M. Brachet, (*Ib.*, p. 371,) who removes this cyst after having slit it open and emptied it; and M. Chailly, (*Ib.*, p. 431,) who lays it open and empties it, and then besmears it with red oxyde of mercury; and all which surgeons supposed they had imagined something new, were doubtless ignorant of what I have said above. *The process which I now adopt* by preference, is exceedingly simple; the youngest pupil may perform it with impunity. Having opened into the tumor by puncture with a bistoury or lancet, the same as for an abscess, I seize, with a good pair of artery forceps, one of the commissures of the cyst, which latter I remove by enucleation, separating it by means of the beak of a spatula, as M. Champion does, or by the myrtle-leaf, cataract scoop, the handle of a scalpel, or merely the nail of the little finger. The operation, therefore, is so easy and prompt, that I cannot see what would be the advantage in substituting for it the employment either of *potassa*, as proposed by M. Brachet, (*Ib.*, t. II., p. 371,) Guérin, or M. Canihac, (Rey, *Thèse*, No. 79, Paris, 1834, p. 91,) or the *Vienna caustic*, as eulogized by M. Hennau, (*Transact. Méd.*, t. II., p. 385,) and by M. R. Gérardin, (*Journal des Conn. Méd. Chir.*, 1837.) It is nevertheless true that, like every other operation, it sometimes gives rise to serious accidents. In a case cited by M. Merat, (*Transact. Méd.*, t. XI., p. 432,) it was followed by tetanus. A female patient, who was operated upon for it in 1825 at the hospital of the Faculty, was seized with an extremely dangerous erysipelas; and in another woman it caused her death. But these are very rare exceptions, which do not take place in one case out of fifty. The wound almost always heals in less than eight days. Left to itself, moreover, the tumor increases in size, and may be transformed into cancer. This is what took place in an old man I operated upon in 1836, and in a woman aged seventy years, whom I operated upon on the 12th of January, 1839. I have removed as many as eleven of these tumors at one sitting. Some patients also have their cranium as it were covered with them.

## ARTICLE IV.—HYDROCEPHALUS.

The principal operation which has been proposed for hydrocephalus is puncture of the cranium. Holbrook and Vose (*Dugés, Manuel d'Obstétrique, &c.*,) profess to have performed it, or to have seen it performed with success. Rossi (*Médecine Opératoire*, t. II., p. 46,) has drawn in this manner, at several times, six pounds of serosity from the cranium of a child eleven to twelve years of age, and who got well. M. Syme, in 1826, had recourse to it five times on the same child, in the space of a few months, and each time with some apparent advantage, though the little patient ultimately perished. M. Greatwood (*The Lancet*, 1829, vol. II., p. 238,) succeeded with it in one case, and M. A. Cooper appears once to have obtained partial success from it. M. Bédor, (*Gaz. Méd.*, 1830, p. 188,) who has also made trial of it, likewise believes that it may answer. But the injury done to the brain by hydrocephalus, is ordinarily too deep-seated for a simple puncture in such cases to restore the health. Nevertheless, should it be decided upon, nothing is easier to do than this, either with the lancet, bistoury, or a small trochar. There would be no other precaution to take than to avoid with care the track of the venous sinuses. Upon the supposition that we did not wish to draw off at once the entire amount of the liquid, I would much prefer repeating the operation from time to time, rather than to leave a canula resting in the wound, as has been proposed by Lecat. As to the rest, it is an operation which now counts a great number of trials. Theodoric (*Portal, Hist. de l'Anat., etc.*, t. I., p. 185,) had already made the remark, that hydrocephalous children treated by the application of the red hot iron to the forehead or the occiput, had ultimately recovered. It appears also that S. Chabbi (*Hévin, Path. Chir.*, t. I., p. 232,) had performed it with success. Also in cases of this disease where it would seem to be required, other surgical means have been resorted to. Warner (*Obs. de Chir.*, obs. 11., p. 69,) says that in a case in which extirpation for a *hydrencephalocele* was performed against his advice, it caused death; and Thiebaut (*Journ. de Desault*, t. III., p. 327,) gives the history of two similar attempts, which were followed by the same result. A case also operated upon in Scotland, and in which a hydrencephalocele that projected above the nose was excised, terminated fatally. Leveillé (*Nouv. Doct. Chir.*, t. III., pp. 47, 48,) who relates this fact, says the same thing took place at Gottingen. In the case of an infant aged seven months, in which the tumor, projecting through the parietal bone, was cut into by Rambaud, (*Journ. de Dehorne*, t. IV., p. 212,) death in fact followed on the day after the operation. The case of an infant mentioned by Sulpis, (*Bonet, Corps de Méd.*, t. IV., p. 6, obs. 7,) was no less unfortunate. I have seen, says M. Champion, two infants die, who were operated upon for this disease in spite of my advice to the contrary, one at the forehead, and the other near the occipital hole. The first died the day after the application of the ligature, which had been placed around the tumor; the other survived only some hours after the ligature had been applied, followed by excision of a hydrocephalous sac of considerable size.

Puncture of the cranium also for hydrocephalus was performed in France before the English surgeons had received it. Pelletan (Heurtault, *Consider. sur Diff. Points de Chir.*, p. 111, 1811,) had recourse to it at the Hotel-Dieu of Paris, the 7th Thermidor, and year VII, on an infant aged twenty-two months. A canula was left remaining in the parts, and the patient died at the expiration of five days. Besides the above examples, we might mention at the present time many other instances of puncture of the cranium in cases of hydrocephalus. Thus M. Graefe (*Arch. Gén. de Méd.*, t. XXVIII., p. 409,) and M. Russel (*Gaz. Méd.*, 1832, p. 641,) have each had a successful case. M. Hoefeling (*Encyclogz. des Sc. Méd.*, 1838, p. 251,) gives a case of hydrocephalus in a child aged five years, who having received a kick from a cow, had the cranium fractured and was thus cured of his disease. I will add that M. Allaire, (*Jour. des Conn. Méd. Chir.*, t. II., p. 305,) who drew by this operation, repeated three times in one month, six ounces of liquid at each of the two first punctures, and four at the last, had not the same success, as his patient died soon after. It is nevertheless true that the cases of M. Conquest (*Gaz. Méd.*, de Paris, 1838, p. 251,) are now sufficiently numerous to merit all the attention of practitioners. In his last table this practitioner relates *nineteen* cases of this operation performed by him during the last ten years. In the first of his cases, M. Conquest, who made but one puncture, drew off 32 ounces of liquid, and obtained complete success. The second underwent three punctures, which yielded thirty-four and a half ounces of serosity, but ultimately ended in death. The third recovered after two punctures and the evacuation of twenty-four ounces of liquid.

In the fourth, death occurred after the fifth puncture and the removal of  $48\frac{1}{2}$  ounces of fluid (de matière.) The fifth died also after four punctures, which furnished 45 ounces of serum; the sixth was cured by the extraction of 26 ounces of liquid in three punctures; whilst in the 7th, 8th, 9th, and 10th, who died, as well as the 12th and 15th, it was not practicable to make [respectively] but two, one, two, two, one, and four punctures, which obtained 20, 8, 22, 17, 7, and 33 ounces of serosity. The 11th, 13th, 14th, 16th, 17th, 18th, and 19th, which recovered, furnished [respectively] 55, 13, 9, 6, 31, 14, and 9 ounces of liquid, by means of 5, 1, 2, 4, 3, 2 and one puncture for each; from whence we have 9 deaths and 10 cures, on the total amount above mentioned. If it were allowable to count on so large a proportion of successful cases as this, there could be no doubt that paracentesis of the cranium ought to be practised in cases of hydrocephalus. But, on one hand, the observations of Pelletan, many similar attempts, collected in the practice of Dupuytren, together with the facts of M. Bedor and M. Allaire, show that up to the present moment, it has scarcely ever succeeded in France. On the other hand, when we reflect upon the possible chances that certain patients might have of living a long time with a hydrocephalus of considerable size, while by puncture they generally succumb at the end of a few days, we have good ground for not deciding upon this operation without some apprehension. In the halls of the Clinique of the Faculty, I have seen a hydrocephalous child of from 5 to 6 years of age, who in other respects appeared to be in sufficiently

good health. I have also had an opportunity of seeing a child of from four to five years of age, who had the cranium *quadrupled* in volume, and which a man hawked about the country to exhibit as a curiosity. A hydrocephalus of considerable size, did not prevent a patient who was for a long time seen at the hospital of Perfectionnement, from living to the age of 25 or 30 years, and Maréchal gives an instance of a patient with hydrocephalus, who attained to his 70th year. These, however, are but rare exceptions, and no one will dispute that hydrocephalus is almost a certain cause of death. A consideration, moreover, which would perhaps influence me in such cases is this, that the existence of hydrocephalic subjects, being accompanied with more or less complete paralysis, and an absolute annihilation almost of the intellectual faculties, is reduced in fact to a vegetative life, and can be of no great moment either to society, the family, or to the individual himself; from whence it follows, that without deceiving ourselves as to its importance, we ought, nevertheless, to have recourse to this operation in patients who seem in other respects to be placed under the most favorable conditions possible.

#### ARTICLE V.—SPINA BIFIDA.

We ought, perhaps, to have treated of spina bifida, under the chapter on Serous Cysts. But the relations of this description of tumor with the encephalon, have in some sort forced me to examine it immediately following hydrocephalus. Modern surgeons believing that they had established the fact that spina bifida always communicates with the arachnoid or sub-arachnoid cavity of the spinal marrow, have thence concluded that it was a disease placed beyond the domain of operative surgery. Under that view the same opinions have been expressed of this disease as of hydrocephalus, of which spina bifida was considered as nothing more than a dependence or variety which might be called *hydrorachis*. On the one hand, however, it may be supposed that many serous cysts, noticed on the posterior plane of the spine, do not communicate with the envelopes of the spinal marrow, and that they originate outside the dura mater. This is nearly demonstrable, especially in one of the patients operated upon by M. Trowbridge, (*Journ. des Progrès*, t. XVII., p. 274,) and who had a serous cyst, with numerous cells, in the lumbar region. On the other hand, we possess, at the present day, sufficiently numerous examples of cures of tumors of this description obtained by various operations. An infant a year old, and who had one of these tumors along the vertebral column, was relieved of it by means of five punctures (mouchetures, see Vol. I.) by M. Labonne (*Revue Méd.*, 1826, t. II. p. 281,) who professes to have in this manner cured a spina bifida.

An infant aged three months, and who had had a similar tumor from its birth, was submitted to puncture by M. Probart, (*Biblioth. Médic.*, 1828, t. II., p. 120.) Erysipelas and convulsive movements supervened; leeches, purgatives and plasters were had recourse to, and the cure was accomplished. M. A. Hawarden (*Ibid.*) is referred to for a fact in every respect similar, and which possibly might be the same. Two examples of successful results obtained

by small punctures on tumors which were situated on the posterior face of the sacrum, have been related by M. Bozetti, (*Journ. des Progrès*, t. V., p. 253.) An interesting case of this kind has been given by M. Wardrop, (*The Lancet*, 1828, vol. I., p. 308.) The tumor, which was also situated upon the sacrum, was fourteen inches in circumference. After several punctures, it was found at the expiration of six weeks to have been reduced two thirds of its dimensions. But convulsions and death, which then took place almost suddenly, afforded an opportunity of proving that the serous pouch communicated directly with the vertebral canal, and that the spinal marrow was sound. M. Trowbridge, of whom I have just spoken, states that he has in two instances succeeded by excising these tumors after having submitted them to a gradual constriction (constriction). From whence it follows, as it appears to me, either that many of the cysts described under the name of spina bifida, do not communicate with the interior of the spinal membranes, or that hydrorachis with hernia of the cyst, is not absolutely incurable. According to this induction we should naturally be led to conclude that it is proper to treat spina bifida by surgical means. In these cases I think we have it in our power to lay down the following rules: 1. If the tumor is not accompanied with paraplegia and the cyst is not too much attenuated, we ought to wait and confine ourselves to the use of topical astringents or compression; 2. Although there may not be paraplegia, if the cyst is very prominent and with a large base, we should perform the puncture with a lancet rather than with a trochar, and repeat the same operation weekly, at the same time that astringents and compression should also be used; 3. Whether the cyst be attenuated or not, or accompanied or not accompanied by paraplegia, it should be strangulated at its root provided it is pediculated; and we should wait until it is shrunk before incising it outside of the constricting ligature; 4. When paraplegia is present, whatever be the form, volume or thickness of the cyst, the treatment to be employed by preference is repeated punctures. Though the surgeon ought to hesitate with a child who is in other respects in the enjoyment of perfect health, the case, in my opinion, is very different when complicated with a profound alteration in the functions of the spinal marrow. In this state the little patient is devoted to a certain death if nothing is done, and we have seen by what precedes, that by means of an operation there is some chance of saving him. In 1824 I saw at the hospital of Perfectionnement, an infant two months old, who had at the point of the sacrum a serous cyst, which was flattened in shape, of a reddish color, and of the size nearly of the fist; and which was ultimately cured by means of four punctures practised during the space of a month, together with compression, aided by topical astringents, continued about five months. A young boy whom I saw at the Hotel Dieu, in 1835, had on the base of the sacrum a transparent tumor, existing there for several years, and having the size of a large pullet's egg, and which certainly would have received the name of spina bifida, if it had been met with in a new-born infant. I have since learned that this tumor, treated by puncture and afterwards by incision, had ultimately entirely disappeared. As for the rest, it is at the base of

the lumbar region, and on all the posterior surface of the sacrum, that the operation in my opinion presents the best chances of success. There in fact there is no longer any spinal marrow, and the inflammation must necessarily be less dangerous than in the other regions of the spine. Certain it is that, restrained by this idea, I did not venture to meddle with a spina bifida which was situated in the cervical region, another which was found near the middle of the dorsal region, nor a third which was sent to me in November, 1838, by M. Larrey, and which had its seat in the upper part of the lumbar region. I have, however, at the *maison de santé* of M. Dufrenois, made trial of repeated punctures with the lancet on a spina bifida in this last-named region, in a new-born infant. The tumor had the dimensions of two five-franc pieces; its walls were thin and of a bright rose color, and threatened to become ruptured; a first puncture sensibly diminished the paraplegia; it was the same with a second and third, and finally with the fourth. But on the twentieth day, convulsions and other signs of arachnitis announced to us that the scene was changed; death took place at the end of the month, and the opening of the dead body performed by M. Behier, in presence of M. Guersent, showed that a purulent inflammation which had commenced at the cyst, had extended itself throughout the whole length of the spinal marrow, reaching into the cranium. I will add to these details, that in the last century, Orth, (*Thèses de Haller*, t. V., p. 218, Juillet, 1719, French translation,) following Salzmann, had already endeavored to make it appear that certain cysts which are developed along the track of the spine ought not to be confounded with spina bifida, and that in our time, M. Busche (*Revue Méd.*, 1829, t. IV., p. 118,) has exerted himself to prove that many of those cysts were partitioned (*cloissons*) like the ovaries, and without communicating with the cephalo-spinal cavities. The four examples related by this last author, are calculated in this respect to inspire practitioners with a certain degree of boldness. Finally, the case of an infant seven months old, who had in the lumbar region a legitimate spina bifida, which Skimer (*Arch. Gén. de Méd.*, 3e série, t. II., p. 494) attempted to treat by repeated punctures, was not more fortunate than the one I have mentioned above.

#### ARTICLE VI.—CEPHALEMATOMA (*Sanguineous Tumors of the Cranium*).

Sanguineous cysts of the cranium are sufficiently often encountered in new-born infants to induce many practitioners to consider them a specific disease, generally known at the present day under the name of cephalematoma (*céphalématome*). Having elsewhere (*Art des Accouchements*, t. II., p. 590, 2e edition) treated of these tumors, I will now speak of them only in their connection with operative surgery. These cysts, moreover, have been sometimes confounded with encephalocele, as is proved by the observations of Le Dran, Trew, M. Michel, and some others. M. Champion informs me that he has seen a surgeon, in other respects a man of great experience, make also a mistake of this kind a short time since. We should, moreover, be deceived if we calculated on finding cephal-

matoma only among new-born infants. Since the publication of the work above cited, I have met in an infant twenty months old, with a sanguineous cyst of more than three inches in diameter, and which covered almost the whole of the frontal bone. Another infant, aged six months, whom I saw with Dr. Démey, had one of similar dimensions on the left parietal bone and a portion of the occipital. A woman, aged 49 years, and a man 26 years of age, presented to me similar examples, one on the right region of the forehead and temple, the other on almost the entire right half of the cranium. Other analogous facts, but less striking than those last mentioned, have also assisted in confirming me in my first opinions on the mechanism and nature of sanguineous tumors of the cranium, to wit: that these cysts are formed by an effusion of blood, which takes place in consequence of vascular rupture or spontaneous exhalation, sometimes between the skin and aponeurosis, more frequently between the aponeurosis and pericranium, quite frequently also between the pericranium and bones, and sometimes between the bones and dura mater. A case noticed by M. Neve (communicated by the author to M. Champion,) would go, in fact, to show that the blood primarily extravasated between the dura mater and cranium, may transude and pass through the bones, and arriving externally, constitute a thrombus or cephalematoma. The mode of curing these tumors is not considered in the same point of view by all practitioners. Puncture, followed by compression and topical resolvents, have obtained decidedly successful results with M. Champion. Others have had the boldness to recur to large incisions, and even to the seton; but I have satisfied myself that with a little patience and some topical astringents, we may almost always succeed in dispersing the tumor without the necessity of an operation. The cephalematoma which I treated in this manner, in consultation with M. Cisset, disappeared at the expiration of a few weeks. The child that M. Démey sent to me, got well in fifteen days. I have seen others which recovered still more rapidly. In the man and woman whom I have mentioned above, the tumors, notwithstanding their extreme dimensions, receded more and more, and ultimately disappeared in the space of a month. It is however true, that in the patient first mentioned, after having made a puncture on the forehead and extracted from it four to five ounces of a sanguinous liquid, I found that the walls of the tumor agglutinated, and that a complete cure followed.

In conclusion, then, I would, in these cases, advise temporization, afterwards compresses wet with a solution of muriate of ammonia, tannin or alum, or some other astringent liquid. Puncture would not be admissible until after unavailing attempts by compression, or unless at the end of a month's treatment, the tumor remaining stationary, seemed rather to have a tendency to increase. Pure and simple puncture will then, in most cases, succeed, especially if we associate with it for some days a slight degree of compression properly applied. To cover the whole extent of the cyst with a temporary blister, would also be an excellent remedy as an adjuvant to puncture or the simple incision; but the most certain remedy in all these old cases, and especially where the cyst contained scarcely any thing but liquid matter, would be the iodine injection, the same as in cases of

hydrocele. I would not, in fine, decide upon laying open the tumor largely or on many of its points until after having made use of all other means, or unless there should exist some serious accident, or that a suppuration kept up by the cephalematoma had actually become established.

#### ARTICLE VII.—OPERATIONS REQUIRED BY THE DISEASES OF THE FRONTAL SINUS.

There are two regions in the cranium where the diseases may require operations so diversified, that we are almost tempted to make them the subject of two special articles. These regions are the frontal sinuses, and the mastoid process; but as it is next to impossible to separate what relates to this last from the operations required for the diseases of the ear, I shall not treat of it upon the present occasion, but speak only of what relates to the frontal sinus, properly so called. Operations have been performed upon the frontal sinus, in cases of fractures, caries, necrosis, abscesses, hydatids, polypi, the presence of foreign bodies, collections of fluid, and various kinds of degeneration. The relations of the frontal sinus with the interior of the nasal fossæ, and with the cranium and orbit, will always render its diseases difficult to diagnosticate and cure, at the same time that they generally increase their danger. The operations which they render necessary must, moreover, in their nature be sufficiently delicate, and sometimes in themselves formidable.

##### § I.

When from a *fracture in the forehead*, some fragments remain displaced posteriorly, in such a manner as to give rise to accidents, it may become advisable to remove the anterior wall of this sinus, either wholly or in part. Facts of this kind have been related by Fallopius, Trew, Maréchal, Colignon, Jackson and many others. In a patient whose case is given by Horne, (*Acad. de Chir.*, t. VI., p. 203, in 12°), there was a fracture at the superciliary ridge. The ablation of the osseous projection was effected; accidents supervened, and bleeding had to be resorted to eight times; but the patient recovered. Lassus (*Méd. Op.*, t. II., p. 259) and M. Larrey, as well as Fichet de Fléchy, (*Observat. de Méd. et de Chir.*, p. 213,) have related examples of cures obtained in the same way, and without the patients having been exposed to the slightest dangers. Muys, (*Nouv. Obs. de Chir.*, p. 438, obs. 5, decad. 8,) who was already aware that the opening into the frontal sinuses has a tendency to become fistulous, and who, on that account directed his attention to the passage of the air, and then to the rolling up (*recoquillement*) of the skin, recommends that we should be careful to contract (*raccourcir*) the borders of the wound in a proper manner immediately after the operation. It is readily conceived also, that in cases of fracture it may sometimes become necessary to enlarge the pre-existing wounds, at other times to establish new ones, also that if the fragments are somewhat loose, we may be enabled to detach them by means of a good pair of forceps, while, on the other hand, if they remain adherent at some point, it

may become necessary to employ the osteotome, gouge, mallet and trephine. In these cases, the surgeon should not forget that purulent collections are especially to be apprehended in the direction of the orbit, and that in order to prevent them, there is no better method than to leave or to establish a free issue for the fluids in this quarter. The incisions required, therefore, should be placed as much as it is possible to do so, rather below than above the eyebrow. I will add, that it is better to make them large than small, and that the cutting pliers, modern osteotomes and trephine should be employed in preference to the chisel or hammer, whenever their application would not seem to be attended with too much difficulty, or except the slightest danger was to be apprehended from any concussion upon the cranium. It would appear that Langguth (*Thèses de Haller*, translation, t. I., p. 125) had foreseen this danger when he advised the employment of the scissors rather than recur to the trephine. O. Acrell, (Sprengel, *Hist. de la Méd.*, t. VII., p. 31,) on the contrary, confined himself to trephining upon the superciliary ridge, in a patient where the frontal bone had been fractured and driven in. In spite of the unsparing censures of Bertrandi, in 1763, on the use of the trephine to the frontal sinuses, and the accusation he makes against it, of leaving an incurable fistula, and of being inconvenient in its application, M. Larrey (*Campagnes Chirurg. d'Egypte*, p. 136) employed it with advantage, even in perforating through the cranium; Collignon (*Biblioth. Chir. du Nord*, p. 179) speaks of a fragment of ball which, having become arrested in the upper eyelid, produced an exfoliation of the anterior wall of the frontal sinus, without being followed by any fistula; and we find in the Memoir of M. Gaultier de Claubry (*Bull. de la Fac. de Méd.* t. III.) a great number of instances where trephining of the frontal sinuses was evidently attended with utility.

### § II.—*Caries and Necrosis.*

Caries and necrosis of the frontal sinuses are a double disease, which there, as elsewhere, are sufficiently often found blended together. Béranger de Carpi and Dulaurens (Portal, *Hist. de l'Anat. et de la Chir.*, t. VI., p. 491) had already noticed that the vault of the frontal sinus was sometimes perforated with holes and, as it were, worm-eaten, and to such extent as to allow of the fluids penetrating into the cranium. Similar facts have since been pointed out by Fabre, (*Ib.*, t. XI., p. 164.) Sellien (*Biblioth. Chir. du Nord.*, p. 100) gives a case of venereal caries, with fungosities of the frontal sinus, and which he cured by means of red precipitate. A man had a caries with softening of the internal orbital process; Janin (*Mémoire et Observations sur les Maladies des Yeux*, p. 290) having made an incision, then excised a portion of the lips of the wound, and removed all the bone he could by means of the bistoury. Camphorated oil was then applied to the remainder of the caries, which ultimately exfoliated and allowed the whole wound to cicatrize. Delpech (*Révue Médicale*, Mai, 1838) speaks of a necrosis, the extraction of which left a large opening into the nose and frontal sinus, which opening he treated by rhinoplasty. The frontal bone was altered to the extent of an inch; a crown of the trephine and some strokes upon the gouge

removed the caries entirely. Obstinate hemorrhages took place at first, but the patient nevertheless, says Cavalier, (*Société de Médecine de Marseilles*, 1817, p. 38,) got well in the space of a month. M. Riberi, (*Gaz. Méd.*, 1838, pp. 795, 796,) in two cases with caries, accompanied by necrosis of the frontal sinus, was not enabled to succeed, except by means of the gouge and mallet. So that examples at the present day are not wanting to show the resources of surgery in cases of necrosis or caries of the frontal sinuses. In these cases, the operation to be preferred is the same as for caries or necrosis in general. It ought moreover to vary according as the disease is more or less extensive, or according as it exists in a simple state, or with different complications. Should the soft parts be sound, it would be advisable to cut from them a semilunar flap, with its free or convex border turned upwards and inwards, so that its lower extremity might terminate on the ascending process of the maxillary bone.

In cases where ulcers and fistulas existed, all that would be required perhaps would be, to enlarge them without making any distinct incisions. In whatever way we have proceeded in laying bare the diseased region, we should, in order to complete the operation, employ the forceps to extract the movable fragments, the bistoury, or a strong scalpel to destroy the softened bones, the chisel or the gouge and mallet, if there were only some splinters to remove, the cutting pliers, or Liston's scissors, in cases where the diseased portion might be very projecting and well circumscribed, and the osteotome of M. Heine or M. Charrière, or even the trephine rather than strokes with the chisel, should it be necessary to go down deep and take away a large portion of bone. Caustics and the red hot iron employed by some surgeons, and again recently by M. Riberi, would not be advantageous in such cases, unless we had to destroy simple fungosities, as in the case related by Sellien, or thin lamellæ.

### § III.—Abscesses.

Caries and necrosis of the frontal sinus frequently result from an abscess which has formed in the interior of this cul-de-sac. The pus confined in an unyielding cavern, ulcerates the mucous membrane which lines it, denudes it, soon mortifies its walls, and finishes by making a passage to itself, either in the direction of the orbit, or the nasal passages, or even into the interior of the cranium ; but besides that such purulent collections in themselves involve sufficiently severe dangers, there may also result from them fistulas or an alteration of the bone which could scarcely be cured but by one of the operations which have been described above. It would be advisable, therefore, to remedy the difficulty in the beginning, if it can be done. Although Borelli, Bartholin, Boetius, Tulpius, Marchettis, Chevassieu, D'Audibert and Celier, have seen cases where abscess in the frontal sinus has got well by making its way through the nasal passages, Richter (*Bibl. Chir. du Nord.*, p. 242 to 249,) nevertheless advises that we should endeavor to re-establish the natural passages, or to create a new one, rather than to destroy the mucous membrane of the sinus. Sauvages, (*Nosologie*, t. VIII., p. 345,) who first makes trial of detergent injections, also prescribes the trephine. An abscess

of the frontal sinus having invaded the ethmoid bone, led to the supposition that it had extended to the maxillary sinus, which was unnecessarily perforated. Other remedies, says Jourdain, (*Maladies de la Bouche*, t. II., p. 101,) directed to the frontal sinus, effected the cure of the patient. In another, Jourdain (*Op. cit.*, t. I., p. 78,) destroyed the anterior nasal wall of the maxillary sinus, in order to reach into the frontal sinus, which was filled with pus, and to introduce injections into it; Frank (*Médec. Prat.*, t. V., p. 38, French translation,) says a physician of Vienna has frequently trephined the frontal sinuses in order to extract from them inspissated mucosities. I should certainly however not recommend that we should go to the extreme of trephining the forehead, for the sole purpose of extracting mucosities or some few drops of pus accumulated behind the internal orbital process. So long as the collections in this cavity have not disorganized its walls, there is reason to hope that they will make their way through the nares; and this is the termination which we ought to encourage by means of fumigations, injections, or even sternutation, before thinking of the trephine. But should the disease have been of long standing, and have resisted every thing, and caused violent pains and severe accidents, and that its diagnosis can be clearly made out, trephining in my opinion would be the best remedy. Two processes may then be employed: either after the manner of M. Riberi, we may incise the soft parts in the upper portion of the great angle of the eye, and perforate with a punch or the perforating trephine, or with the scalpel only; or what is better, with a small crown of the trephine, the upper part of the os unguis, or the ascending process of the maxillary bone, and the extremity of the internal orbital process, in such manner as to penetrate into the nares and create there a passage for the liquids, and to be enabled to shut up the solution of continuity in good season, without having any apprehension of the formation of a fistula. It is important under such circumstances to avoid wounding the lachrymal sac, and the tendon of the orbicularis muscle; also, it would be advisable to cut out a semilunar flap whose free border should look inwards and forwards. No doubt this method would be successful, if the collection in the frontal sinus was prolonged very far downwards, and if it were not yet complicated either with caries or necrosis. Otherwise it is better directly to attack the frontal sinus itself; taking care if it is not yet ulcerated to open it at its most depending part, that is to say, between the upper eyelid and the top [or the inner extremity (*la tête*)] of the superciliary ridge. The operation moreover would, in almost every particular, be the same as that which I have pointed out in the preceding case. It would differ from it only in having to prolong the incision in the form of an arc a little higher up and somewhat more outwardly, and that the trephine and perforators would act exclusively on the frontal bone, instead of including at the same time both the maxillary bone and the os unguis.

#### § IV.—*Foreign Bodies.*

Besides pus, there have been found in the frontal sinuses, under the character of foreign bodies, clots of blood, polypi, stones,

worms, &c. Chaptal, the father, (*Sauvages, Nosologie*, t. VI., p. 177,) having noticed that pains of the head which had persisted with violence for a long time, disappeared in consequence of a nasal hemorrhage, concluded on that account, without, as it seems to me, being perfectly authorized to do so, that blood retained in the frontal sinus had been the cause of this suffering. Instances of calculi in the frontal sinus, related by Bartholin, F. de Hilden, and Schenckius, are somewhat more positive, since an opportunity presented of identifying the objects by direct observation. The same may be said of the cases of a *tent* there mentioned by Holegost, and also those of a *ball* which, according to Zacutus Lusitanus, would constitute conditions calling for the application of the trephine. Cesar Magatus (*Journ. Gén. de Méd.*, t. XLV., p. 331,) says a patient was cured by trephining his frontal sinus for a *worm*, and Rossi (*Médec. Opér.*, t. II., p. 116, note 5,) had recourse to this operation in order to place a ligature around the root of a *polypus*, which he afterwards extracted through the nares. A fistula which was thereby caused in this case, lasted for the space of three years, and was not cured until after the rupture of the osseous lamina which separates the sinus from the nasal cavities. In the case of M. Hoffman (*Rév. Méd.*, 1826, t. II., p. 152,) it became necessary after the extraction of the polypus, to pass a seton from the sinus into the nose. M. Langenbeck (*Biblioth. Chir.*, or S. Cooper's *Dictionnaire de Chir.*, t. I., p. 439,) finding a large tumor external to and above the root of the nose, had recourse to the trephine in order to open into it, when he recognized that it was made up of an enormous *hydatid mass*. A cavity two and a half inches deep remained at the place which the tumor had occupied. Other foreign bodies also have been noticed in the frontal sinus: Salzmann (*Convulsions des enfans*, p. 248,) states that he has found and killed worms there. M. Maunoir (*Questions sur les corps étrangers*, p. 204,) and also M. Breschet (*Dict. des Sc. Méd.*, t. VII., p. 4,) speak of *balls* retained in this cavity for the space of three months. M. Larrey (*Campag. Chir.*, t. IV., p. 89,) relates that the Chevalier Erasme retained the point of a *javelin* for fourteen years in the frontal sinus. M. Dezeimeris (*L'Expérience*, t. I., p. 572,) has extracted from the cartons of the ancient Academy of Surgery, the case of a fungous tumor of the form of the patella, and which was situated in the frontal sinus. M. Brunn, (*De Hydropo Cystico. &c.*, Berlin, 1829; *Journ. des Progrès*, t. II., sér. 2, p. 255; *L'Expérience*, t. I., p. 568,) a Prussian surgeon, speaks of a young girl who, being tormented by a supra-orbital tumor, died after having been submitted to a crucial incision upon the same and the employment of the seton. Now this tumor, which was attended with a sero-sanguineous liquid and a fetid suppuration, and which was five and a half inches long and four and three-quarters in breadth, situated in the frontal sinus and composed of cells or small bladders, which had become developed in the space of five years, might have evidently been extirpated if it had been attacked at an earlier period and in a proper manner; an instance of a hydatid tumor of the forehead had already been mentioned by M. Corby, (*Biblioth. Médic.*, 1829, t. III., p. 20,) but in this case the disease was altogether independent of the sinus. The presence of foreign bodies in the frontal sinus would still

more positively call for the application of the trephine than any other of the diseases of which I have hitherto spoken. Their diagnosis, therefore, is a point of great delicacy. As to the operative manual here, also, two modifications would be offered, according as the sinus was intact or already laid open. In the first case it would be necessary to cut down in such manner as to lay bare the tumor extensively, and in preference by the semilunar flap which I have indicated in the beginning. The crown of the trephine would be better adapted here than any where else, and even than the other osteotomes: only that it would be advisable to apply two small ones, one on the side towards the orbit below, the other at the top [inner extremity] of the superciliary ridge above, which should be done in order to obviate the inconveniences which result from the irregularities of the frontal bone in this region. The points, bridle or bridge left between the two crowns, could afterwards be easily destroyed by means of the scalpel, cutting pliers or chisel. Should there have already existed any fistulas or ulcerous passages, they could be made use of as a guide by which to reach the foreign body, and the enlargement of these might be all that was required to give to the incisions the form and extent that were necessary. I have no need of remarking that the foreign body itself when once laid bare, may require the aid of the forceps, even the cutting pliers, and elevators and ligatures, and the use of the bistoury and dissections, more or less cautiously conducted, according as it is movable in the sinus or implanted in the bones, or is in a fluid state or concrete. This remark applies also to necrosis as well as to foreign bodies.

### § V.

Though the immediate consequences of this operation might be serious, they are nevertheless ordinarily very simple. One of the most disagreeable is that of often leaving a fistula, which is exceedingly difficult to close up. I have, however, seen this fistula heal up in two instances in patients who had the anterior wall of the frontal sinus destroyed by necrosis, and in a third in whom this wall was lost in consequence of a comminuted fracture. That of P. Gerardi, after receiving no benefit from the dilatation of the frontal sinus through the nares, yielded to the action of a machine similar to that which F. ab Aquapendente and Petit made use of to compress the lachrymal sac, a contrivance which Rossi, (*Médec. Oper.*, t. II., p. 244,) who does not pretend to have invented it, calls a presser (*pressoir*), and which M. Riberi, who again revived it in 1838, appears to have employed like his countryman, but without obtaining, however, any real advantages from it. Perhaps it has not been sufficiently examined in these cases if the interior of the sinus was perfectly free of disease. I suspect, in fact, that the fistula here depends chiefly upon certain particles of altered bone, or ulcerations, or points of caries, much more than on the physical and natural disposition of the sinus. I would, therefore, advise before all other steps, that we should carefully explore the parts and remove from the region every thing which has the least appearance of disorganization. If after this, lotions and detergative and astrigent injections, and even slight cauterizations should not suffice, I

would then willingly give the preference to perforation of the inner wall of the sinus in its lower portion, and in such manner as to make it communicate freely with the nose. Rossi (*Méd. Oper.*, p. 116, note,) by dilating the internal orifice and breaking the nasal wall of the sinus, succeeded completely. Perhaps even an opportunity would here offer of inserting a large and somewhat short canula constructed after the model of lachrymal canulas. In conclusion, the facts which relate to the operations required for the frontal sinus, are so dispersed through works of science, and given mostly with details so vague, and these operations have been so rarely performed with us, that it would be difficult at the present time to subject them to general rules that are either very precise or very useful. [See a note farther on. T.]

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## CHAPTER II.

### FACE.

The operations which are performed on the face are numerous and varied, but many of them have been described elsewhere, (see Vol. I. and Vol. II. of this work, on the respective subjects of *Anaplasty*, *Exsections*, and *Tumors*.)

#### ARTICLE I.—OPERATIONS WHICH ARE PERFORMED ON THE NOSE.

I have not to consider here the different forms of rhinoplasty, the details of which will be found under the chapter on *Anaplasty*, (Vol. I. See also our *notes* there.)

##### § I.—*Tumors.*

Tumors of various kinds may be developed in the nose, the same as in any other region. As I shall have to treat of polypi of the nasal fossæ after having spoken of the operations which are performed on the velum palati, I do not design at the present moment, to touch upon any other than tumors which are situated in the substance of the nose, properly so called. As respects the operation they require, these tumors form two classes, some of them having their seat on the body of the organ, others in the septum.

A. *The nose, properly so called.*—I. We find on the body of the nose three principal varieties of tumors which occasionally require the aid of operative surgery. These are worms (*tannes or maggots*), cancers or elephantine masses. In no region, perhaps, are the *sebaceous follicles* more frequently altered than upon the nose. So long as the substance with which they are filled does not exceed the dimensions of a pin's head, and are unattended with any degenerescence of the cutaneous tissue, the disease would not justify any kind of operation. On the contrary, should the crypt itself become thickened and transformed into a tumor which had acquired the size of a bean or the

head of a nail, it might be advisable to attack it by other means than by simple pressure. In such cases the subject of extirpation might be taken into consideration; but cauterization with a crayon of nitrate of silver cut into the shape of a cone, with its point carefully introduced into the aperture and down to the bottom of the sebaceous follicle, will almost always answer. If the tumor were still more developed; if, for example, it exceeded the volume of a small nut, and presented itself under the aspect of a cyst with thin walls, filled with matter of a purely fatty character, then extirpation would evidently be preferable. [See our note above, pp. 60-63, giving the case (with plates) of those enormous tumors of this kind, which I successfully removed at Nassau, capital of the Bahamas, in 1824. T.]

II. Tumors and *cancerous* degenerescences of the nose usually exhibit characters that are altogether peculiar. They are usually rather plates, bumps, (bosselures,) or incrustations, than tumors that are exactly circumscribed, or that can be arranged under scirrhus, or those that are encephaloidal, or melanotic, or of the colloid tissue. Their origin most frequently seems to be connected with a vitiated secretion or degenerescence of the sebaceous follicles themselves. In all cases these tumors, which are usually badly defined, and scarcely found except in persons advanced in age, exact certain precautions in a surgical point of view. The treatment by caustics generally succeeds with them perfectly well. A lady who had one of the diameter of an inch for many years, was cured by means of four cauterizations with the nitrate acid of mercury. An ancient officer of marine, whom M. P. Pelletan sent to me, had, on the left side of his nose, a cancerous, bosselated, sanious plate of a reddish color, which had been there over two years. Every kind of topical and internal treatment had been resorted to in this case. Slight cauterizations with the liquid above mentioned, effected a cure in the space of six weeks. The father of a young physician, in the environs of Nantes, had, on the lobule of his nose, one of those plates, (plaques,) which completely disappeared under the influence of four similar cauterizations; and I could at the present time relate a great number of similar facts. To succeed in such cases, it becomes necessary to clean the tumor carefully of all the crusts with which it may be covered. I then besmear it with butter in the evening and morning, with the view of softening this incrustation the night before each cauterization. All the crusts thus besmeared easily allow afterwards of being detached, and we thus have the altered plate immediately naked before us. I then take a small pinch of lint which has been saturated with the liquid above mentioned, to touch in every part, and even a little beyond it, the surface to be destroyed. The pain which it produces at first is sometimes quite severe. The parts touched by the acid become white, and excite occasionally a slight exudation of blood; there is then formed upon the surface a yellowish crust, which may be detached at the expiration of four or five days, in order to renew the same operation, and so on to the end of the cure. From four to six or eight cauterizations applied in this manner are generally sufficient. If the plate should be composed of an agglomeration of sebaceous follicles, the cone of nitrate of silver introduced to the bottom of each one of them would succeed equally well, and would even be

more suitable. When it is thicker, hard, and of a certain breadth, the *zinc paste* appears to me to be preferable. Having vivified (*avivé*) the altered surface, by means of ammonia or a blister, and taken care to do so effectually, which the nature of the tissue in these cases sometimes renders difficult, we apply over it a plate of zinc paste, (*pâte de zinc*) from one to three lines thick, in such a manner that this plate goes half a line beyond the entire circumference of the tumor; we then fix it here by means of a suitable containing bandage, taking care that nothing is disturbed, at least during twenty-four hours. All the degenerated tissue is transformed, by means of this caustic, into an eschar, which falling off at the end of six to twelve days, leaves in its place a wound whose aspect soon announces that cicatrization is about to commence, and whose bottom dries up and quickly becomes a sufficiently regular portion of the surface of the nose. Moreover it is important, when we employ zinc paste, potash, or butter of antimony on the nose, not to penetrate too deeply, and to remember that in this region the teguments are very thin, and that it would be easy to come down upon the bones or to the cartilages, so as to produce a necrosis there, as M. Champion has seen in two instances. Upon the supposition that the tumor had much more thickness than breadth, we might perhaps attack it with the bistoury rather than by caustics. We should succeed by this method if, after the tumor was removed, the lips of the wound could be readily brought together, either by simple tractions, or after having detached them on their deep-seated surface to the extent of some lines all round. Should the loss of substance be too considerable to do this with facility, we should have nothing more to do than to recur to the resources of rhinoplasty, or be contented with a cicatrization by second intention. This last practice would have to be adopted for the operations performed on the sides of the nose, and between the forehead and the wings of this organ; and in this case there could be no other than advantages follow from cauterizing at the first the whole bottom of the wound. At the root of the nose anaplastic processes present sufficient chances of success to authorize their employment. At the point or the alæ, they would become still more important, since cicatrization there by second intention is almost always followed by considerable deformity.

III. *Elephantine Tumors*.—The nose, in certain individuals, is sometimes transformed into a reddish mass of a violet color, at other times simply greyish and covered with bumps, and which has given rise to the expression of *mushroom* or *potato* nose. This alteration, which seems to be no other than an extraordinary development of the natural integuments of the part, may acquire so great a degree of extension that there results from it upon the nose an actual tumor, very analogous as to its nature to elephantine tumors of the scrotum. These tumors have sometimes been seen to acquire a weight of several pounds. As they do not cause any pain, rarely ulcerate, or undergo any transformation of a bad character; and as it is also almost impossible to get rid of them by other than by surgical means, patients do not usually pay any attention to them until they have arrived at a very advanced stage of their development. Imbert de Llonnes (*Opér. Faite, le 16 Brumaire, an VII, in 8°, 8 pages,*) has published a very remarkable exam-

of one. A former mayor of Angouleme had on his nose a bossesated tumor of the weight of about two pounds, and which hung down as far as the chin, hermetically closing up the nostrils and the mouth. This man, in order to breathe and speak, was obliged to bend down with his head forwards. He could neither eat or sleep except by raising up his tumor, which he suspended by means of a sling fixed to his night-cap,—a ligature, which had been made trial of, caused such pain that it had to be laid aside. Imbert then decided upon extirpating it, and was obliged to lay bare the whole surface of the nose, which operation required twenty-two minutes. No accident took place, and the patient got perfectly well, preserving a nose which was not very greatly deformed.

Analogous facts have been related by the Academy of Surgery, (*Mémoires*, t. III., p. 511,) and the work of Hey contains some which are not less interesting. The subject, however, had no longer been spoken of by practitioners, when M. Dalrimple (*The Med. Quarterly Review; Gaz. Méd.*, 1834, p. 136,) communicated new facts in relation to it. In his first patient, who was fifty-four years of age, the tumor hung down upon the mouth and reached nearly as far as the chin; the surgeon removed it on the 4th of August, 1826, and the wound healed up in a month without leaving any disagreeable deformity. Another patient operated upon in the same manner, got well in as short a space of time. In performing this operation in 1831, in a man who was more than eighty years of age, M. Dalrimple was obliged to remove a tumor almost as voluminous as that which has been described and figured by Imbert de Llonnes. No indications of a return have shown themselves since. In these different cases, it is important during the dissection of the parts, that the surgeon should place one of his fingers in the nostril, in order to direct the action of the bistoury, and to guard himself better against every perforation. As for the rest, the removal of maggots, cancers, and elephantine tumors of the nose does not differ from that of diseases of the same kind which are seen in any other region. It would be the same also with erectile tumors: Maréchal (*Archiv. Gén. de Méd.*, t. XXIII., p. 149) successfully extirpated one which was of the size of a nutmeg, and which was situated at the tip of the nose.

IV. I will nevertheless remark, that on this last point it is important to recollect the cul-de-sac which lies under it, and that the lobule of the nose is hollow behind, and generally furnished with walls that have but little thickness. So that in fact this organization renders their perforation almost inevitable when the cutting instrument is applied to it, or the slightest caustic of any activity. From whence there results a species of hole which is readily transformed into a *fistula*, and which being once cicatrized in its periphery, cannot afterwards be closed but with an extreme degree of difficulty. I have met with two patients in whom the end of the nose had been excised in order to destroy a cancer, and in whom this fistula resisted every kind of attempt directed against it. A young girl, who in falling from her bed cut her lip and the lobule of the nose, in striking her face against a chamber-pot, which she broke, rapidly got well of all her wounds, with the exception of a point of the lobule of the nose, which remained fistulous. I was not however enabled to cure this

fistula, until after having abraded it by means of the bistoury, and reunited its borders by a point of the twisted suture. The attempt at reunion by every different kind of bandage or plaster, cauterizations with the nitrate of silver, nitrate acid of mercury, and the head of a probe heated to a white heat, which had been made trial of during the space of two months, had completely failed. We should have, therefore, in such cases, to resort to abrasion and the suture, provided the suspension or the elevation of the end of the nose by means of adhesive plasters or any kind of bandage and cauterizations well applied, did not answer at first.

B. *Tumors of the Septum, (cloison.)*—The septum of the nose in front of the cartilage which divides the nares into two passages, is quite frequently the seat of tumors, to which the moderns only have paid any serious attention. These tumors sometimes concrete, but most usually liquid, establish themselves between the two tegumentary layers which are continuous from the exterior to the interior to line the nasal fossæ. An English surgeon, M. Fleming, (*Dublin Journal*, 1833; *Gaz. Méd.*, 1833, p. 798,) has frequently met with tumors purely sanguineous in this part, a disease which is sufficiently common in that country, says the author, in consequence of the mode of attack which the English so often make use of in their pugilistic combats. M. Cloquet (*Journ. Hebd.*, No. 91, p. 544, 1830) appears to have observed abscesses here very frequently, and M. A. Bérard (*Arch. Gén. de Méd.*, 3e série, t. I., p. 408) has published two cases similar to those of M. Cloquet. I have also on my part seen in the substance of the sub-septum of the nose, collections of blood or of pus and masses that were semi-concrete, and, as it were, tuberculous. Whether liquid or concrete, the tumor, nevertheless, in such instances, protrudes on each side into the openings of the nose. If it is a deposit of blood from external violence, time and topical resolvents will generally remove it in the space of fifteen days or a month. In case of failure, we should have at a subsequent period to treat them by incision, or in the manner I have said of céphalématomata. Abscesses should be laid open as soon as possible upon one side, and freely, if the same sac projected to the right and left; upon two sides, on the contrary, if there were two abscesses there in place of one. We should proceed also in the same manner if the abscesses were simply tuberculous, except that we should then have to apply afterwards the nitrate of silver throughout the whole extent of the morbid cavity. For tumors that were purely concrete, or where there was an alteration of the anterior border of the cartilage of the septum narium, we should have to proceed in another way. In describing the sub-septum of the nose, Bichat indicates the possibility of an *operation*, which up to the present time had existed only as a project, but which M. Rigal has performed. In backing on the median line, the cartilages of the lobule leave between them a small groove, perceptible even through the skin, which enables us to separate them apart by means of the instrument, and to penetrate as far as to the septum narium without opening into those cavities. A cancerous tumor developed under the anterior nasal spine, and which had gradually extended in front, downwards, and on the side, as far as to the alæ of the nose, had nevertheless scarcely altered the tegumentary layer.

Two incisions, united in front and passing around behind and outward in such manner as to represent a  $\Lambda$  reversed, having surrounded the cancer laterally, it became easy, by means of a transverse incision, to detach it below from the upper lip, then by doubling back the two lips of the first wound, to arrive at the cartilage of the septum, to excise its anterior border and remove the entire morbid mass. The sides of the division were afterwards brought together, and the cure was uninterrupted by any accident, unless it was that the progress of the cicatrization, by drawing the tissues backwards, had ultimately flattened a little the alæ and the top of the nose.

### *§ II.—Occlusion and Contraction of the Nares.*

In consequence of confluent small-pox, syphilitic or other inflammations, rhinoplasty itself, and all lesions in fact which may alter the form of the nose, the anterior opening of this organ is liable to become closed up, or at least to be narrowed to so great a degree as to interfere very materially with respiration.

A. *Ordinary processes.*—We remedy such inconveniences by three different modes: 1. Dilatation; 2. Incision; 3. Excision. It is rare that dilatation alone suffices; it is besides applicable only in cases of narrowing, and not of entire closure of the passages. Incision in its turn almost always requires dilatation to be associated with it. Excision becomes useful only where tubercles or morbid projections are to be removed. Should the opening be merely narrowed we incise it by numerous excentric cuts, and to greater or less depth, according to the extent of the disease. When it is entirely closed up a narrow bistoury should then be plunged in at the place which it usually occupies. We make in this manner an antero-posterior incision, the borders of which it would be afterwards advisable, as I think, to divide on two or three points of their length. To prevent the wound or small wounds from reuniting and destroying the effect of the operation, it is recommended to keep them open and separated apart by means of a tent of lint or linen. As we must by every means in our power force them to cicatrize separately, and in the position we have first given them, it appears to me that we might attain our object better by means of a piece of sheet lead rolled up in the shape of a ring, and to which we could moreover give such form as we desired, than by means of the dilating bodies generally employed. It is, however, an operation too simple to require that I should dwell any longer upon it. Nor have I found that it has been as difficult as has generally been said, to give to the opening of the nares again in this manner, their necessary dimensions. A young girl whom I received into the hospital of La Pitié in 1833, and in whom the openings of the nose had been reduced to a small aperture, in consequence of an eczematous affection, which had been for a long time cured, was submitted by me to the excentric incision of the cicatrix, afterwards to dilatation by means of a large canula of gum elastic, and recovered perfectly well. I saw her again more than a year after, and there was not the slightest tendency to any contraction of the anterior opening of the nares.

**B. New method.**—If the incision or the simple excision should not appear to present all the chances of success desirable, there might perhaps be a mode of arriving at something more certain, by adopting the following course. The surgeon, provided with a straight bistoury, would circumscribe the whole of the deformed cicatrix, by surrounding its base on the border of the former opening, and very near the skin of the nose. Afterwards dissecting this circle as if to isolate it, as it were, from the internal surface of the organ, and in such manner, that after having removed the entire arcade of morbid tissue we should have in its place a prismoidal groove, there would be nothing more to do than to bring together the two borders of this new wound by a sufficient number of points of suture. We should thus procure immediate reunion by means of an operation, which leaving no wound, nor any traumatic surface in the interior, would not expose to a new contraction. It would be, moreover, applying to the openings of the nose, what I have proposed as one of the best methods for contractions of the mouth. I will add, that by following this method, it would be rendered almost unnecessary, to keep a canula or any foreign body in the nose during the cicatrization of the wound. Having treated of the manner of reconstructing the sub-septum and the alæ of the nose under the chapter on Anaplasty, I do not propose to recur to it again at this time. I will only remark, that having seen in 1838 the person formerly operated upon by M. Gensoul and previously by Dupuytren, I was enabled to ascertain that the flap borrowed from the upper lip and fixed to the lobule of the nose, in order to construct the fibro-cartilaginous septum, which a lupus had destroyed in this patient, had maintained itself in a sufficiently satisfactory condition. The only inconvenience which results from it is a slight depression of the lobule of the nose and too great a projection of the sub-septum (or columna) below. This fact proves then incontestably, as do those also which have been published by M. Liston, that the sub-septum of the nose may be perfectly well re-established by means of an elongated flap taken from the middle of the upper lip. (See notes on Anaplasty, Vol. I.)

**C. Rhinoraphy,** or the simple suture of a slit, either in the alæ or in any other part of the nose, as practised with success by M. Roux, and also by myself, being no other than a modification of rhinoplasty, or subject to the same rules as cheilaraphy, does not require to be described separately.

## ARTICLE II.—LACHRYMAL PASSAGES (voies).

The *nasal canal*, formed on the inside by the posterior border of the ascending process of the superior maxillary bone, and the anterior third of the os unguis, and altogether below by a small lamella of the inferior turbinated bone; outwards, forwards, and backwards, by the maxillary bone, and its turbinated bone, and then in a slight degree by the ensiform process (*crochet*) of the os unguis; having a length of three to five lines; circular at the middle part; a little wider from before backward than transversely, on its upper portion; and terminating below by an orifice which flares open in the manner of a funnel,—possesses in reality no solidity except in

the antero-internal third of its circumference : from whence it follows that in attempting to pass an instrument (traverser) through it, it is very easy to break its other walls, and penetrate either into the nasal fossæ or the maxillary sinus. The lachrymal groove (*la gouttière lacrymale*,—i. e. gutter,) which seems to prolong its internal wall as far as to the corresponding orbital process of the frontal bone, and which is more and more superficial in proportion as we ascend into the orbit, presents on the other hand inferiorly two lips, which are easily recognized ; one anterior belonging to the ascending process, the other posterior and formed by the outer crest of the *os unguis*. The fibro-mucous membrane, which lines the nasal canal, and to which it is but slightly adherent, becomes much stronger and more complicated in the gutter, where it takes the name of the *lachrymal sac*. Here the direct tendon of the orbicularis muscle crosses its anterior face at a right angle, as if to divide it into two halves, the one superior upon which this tendon sends off a fibrous expansion, known under the name of reflected tendon, the other inferior and lined outwardly by cellular tissue, and which has boundaries which it is exceedingly important should be understood. This last mentioned portion [of the lachrymal sac] is always confined within that triangular space, which is bounded above by the direct tendon, below by the border (*rebord*) of the orbit, and outwardly by a vertical line which would fall upon the outer side of the caruncula lachrymalis. It is, moreover, covered only by some fleshy fibres, and by lamellar tissue, and the teguments of the nasal angle of the eye. Being but feebly supported by the surrounding tissues, it readily yields to the influence of causes which have a tendency to dilate it, and thus frequently becomes the seat of tumor and of fistula lachrymalis.

The apertures for absorbing the *tears*, (*puncta lachrymalia*,) and which are surrounded by a small elastic and dense, but not cartilaginous circle, have a direction perfectly vertical, but form a very distinct angle (*coude*) where they become continuous with the lachrymal duct, properly so called. This last, which traverses only the inner fifth of the free borders of the eyelids, is situated more especially upon their posterior portion. Being formed by the mucous membrane only, it is exceedingly thin, and superficial in its postero-superior half; while the remainder of its circumference, making part of the body of the eyelids, presents in front and below a far greater degree of solidity of texture. Now, it is this anatomical arrangement which obliges us to enter perpendicularly at first, in order to rest afterwards much more in a direction towards the eyelid than the eye, when we catheterize the lachrymal ducts themselves. At their entrance into the sac these ducts are sometimes separated by a small projection or sort of spur ; frequently also, they unite together by one opening. Taken together, the lachrymal sac and nasal canal present a double curve, which has some resemblance to that of an Italic *S*, that is to say, that the first [the sac] is slightly convex posteriorly and inwards, while the second [the nasal canal] is so in the contrary direction ; so that in order to perform catheterism on the upper eyelid, we must take care while the probe is traversing the sac, to incline its lower extremity rather forwards and outwards, than in an opposite direction, and that in order to traverse the nasal canal, it is

better, on the contrary, to push the instrument from before backwards, and from without inwards. As every one must have remarked, the axis of the nasal canal in its relations with the supra-orbital projection, presents very numerous modifications; as does also the depth to which we have to go to find it in the orbit. In persons in whom the root of the nose is flattened and broad (large) it appears to be thrown outwards, and perceptibly contracted. When on the contrary, the ossa nasi (*les os carrés*) are very nearly approximated to each other at their inner surface, we cannot reach it except by coming much nearer to the median line. When the frontal bone is very projecting, and the maxillary bone very prominent, the nasal canal (*conduit des larmes*)\* is found at a very considerable distance from the posterior surface of the direct tendon, while in persons who have the canine fossa very deep, and the forehead depressed, it appears to come out a slight distance beyond this tendon. The species of valve or diaphragm which contracts its lower extremity, is usually perforated only in its posterior half. Its orifice [i. e., the outlet of the nasal canal into the nostril, T.] is situated at the depth of six or eight lines in the nose, at the apex of a cavity which is bounded in front by the base of the ascending process of the *os maxillare*, and inward by the concave surface of the inferior turbinated bone. As this cavity is prolonged a little more in front of than posteriorly to the lachrymal valve, it happens sometimes that catheterism at this lower part (*cathéterisme inférieur*) is very difficult if the surgeon is not aware of this arrangement. The length of the nasal canal itself rarely exceeds from six to eight lines. Demours has met with *bridles* in the nasal canal. M. Taillefer (*Thèse*, Paris,) describes a membranous duplicature [*repli*] which was situated in its upper third, and the free border of which, directed downwards, sent off several filaments, which attached it to another point in the same canal; so that if a probe had been passed from below upwards it would evidently have been arrested by this anomaly. Different authors whose observations are given by Sandifort, relate examples of small calculi found in the lachrymal passages; similar instances also have been since related by Schmucker, Eller, Walther, Krimer, M. Levanier, M. Graefe, and formerly by Kern. More than this, the nasal canal has been found entirely closed; Morgagni gives an instance where both were closed, [*en relate un exemple double,*] and Jurine as well as Dupuytren, have both met with one. The *lachrymal passages* may be the seat of lesions in each of their three principal divisions, viz., in the sac, the ducts and the puncta lachrymalia, and also in the nasal canal.

### § I.—*The Puncta and their Ducts.*

A. The puncta and lachrymal ducts may be *obliterated*. Small pox, purulent ophthalmia, a long protracted blepharitis, wounds and ulcers on the internal portion of the eyelids, are the principal sources of this alteration. The tears being then no longer able to penetrate

\* As our author a few lines above applies *conduit lacrymal* to the lachrymal or tear ducts properly so called, this inadvertence might lead to ambiguity, but for the subsequent rectification it receives by his admirable anatomical precision. T.

into the sac, run over upon the cheek, so that the eye is moistened as if weeping, (lave,) while there is present at the same time a peculiar dryness in the corresponding nostril. We may then have present epiphora, an alteration, or even the disappearance of the punctum lachrymale, and ulcerous, purulent, atrophied or hypertrophied condition of the border of the eyelids, and afterwards of the nose, with the absence of all kind of tumor or fistula lachrymalis.

Gunz states that he has seen a case of this kind in which however the tears found their way into the nasal canal by means of porosities which were recognizable to the naked eye. This kind of alteration, which has not been taken notice of but by a few persons, is worthy of additional researches and appears to be altogether incurable. J. L. Petit and Pellier, who pretend to have reconstructed an obliterated lachrymal duct, by passing a sharp pointed probe through the place it had occupied, were certainly deceived by some of the circumstances of the case. Whatever in fact may be the instrument made use of to fray out a passage so delicate as the lachrymal duct, and whatever may be the kind of seton afterwards employed in this passage to keep it open permanently, we may rest assured that the tears will not take that course, and that it will shut up as soon as the dilating body is removed. Such operations therefore are perfectly useless; it is better in such cases to imitate Bosche (*Malgaigne, Thèse de Concours, 1835,*) and cauterize the puncta in order to close them permanently, should there be any trace of them left. If they were merely contracted or only obstructed by some thick matter, all that could be done would be to clean out the passage by means of Anel's syringe and injections. In such cases A. Petit (*Peiffer, Thèses de Paris, No. 222, 1830*) and Léveillé (*Traduct. de Scarpa, t. I., p. 84,*) are of opinion that we ought to establish an opening to the lachrymal sac by means of loss of substance between the caruncula and eyelid, at the place which Pouteau had selected. But it is not probable that such an opening would keep open for any considerable time, nor that it would afford any particular relief. An artificial opening by excision to the duct itself, upon the inner side of the punctum obliterated, would do much better. It continued open in two patients upon whom I had operated with another object in view.

B. *Fistulas of the Duct.*—Should any ulcer or lesion happen to perforate the lachrymal duct on the side towards the eye, there might result from it a particular form of fistula which is one of the most difficult to heal. A thread of gold or silk, or small cord of cat-gut, passed in the manner of a seton through the injured duct, from the punctum as far as the lachrymal sac, is the only remedy that art possesses against an infirmity of this kind, unless we should have recourse to opening the nasal canal on the inside of the eyelids. I have moreover, in two cases, seen the tears pass through the new route, that is, by the accidental aperture into the duct, in the same way as through the natural punctum, without any inconveniences resulting therefrom, and I doubt if fistula of the puncta lachrymalia in reality constitutes a disease.

C. *Cysts.*—Sometimes also one of the puncta of the lachrymal duct becomes dilated in the manner of a cyst. So at least J. L. Petit,

Boyer and Pellier state that they have seen it. As the tumor causes no pain, it should be treated by resolvents, so long as it shall not have acquired such size as to render it too troublesome. It would moreover be unnecessary to extirpate it in order to obtain a radical cure; as it would be equally certain to disappear by laying it open and cauterizing its interior. Formerly they used to expect that there would result from this an obliteration of the duct and probably also an incurable epiphora. But I shall have occasion farther on to refer to some facts which will have a tendency to allay the fears of surgeons on this subject.

D. *Polypi*.—The lachrymal puncta are also liable to a species of small vegetations or kind of polypi. Demours (*Précis des Maladies des Yeux*, 1821) speaks of a small fungus which protruded from the lower lachrymal punctum, and which he cured by excision followed by cauterization.

#### § II.—*Lachrymal Tumors and Fistulae Lachrymales.*

The lachrymal tumor is rarely if ever a dangerous disease: it commodes by the crustaceous condition which it keeps up on the border of the eyelids, causing thus a predisposition to ophthalmia, the sensation of dryness which it produces in the nostrils, the purulent matters which it forces to flow back upon the eye, and by the deformity it causes in the great angle; but it compromises neither life nor the general health, nor even the physiological condition of the globe of the eye, properly so called. It may however ultimately, and it is thus in fact that it most frequently terminates, give rise to acute inflammation in the sac, then in the neighboring tissues, or it may become transformed into an internal anchylops, and finally produce a fistula lachrymalis. This inflammation of the lachrymal sac sometimes reaches the periosteum of the neighboring bones, as of the os unguis (lachrymal bone), for example, or the maxillary or ethmoid, or even the frontal and nasal bone, so as to denude them and cause necrosis or caries of the inner wall of the lachrymal sac or nasal canal. I have seen this inflammation extend itself to almost the entire side of the face, and terminate in the manner of phlegmonous erysipelas in the eyelids and at the root of the nose. Happily these are but exceptions, and the lachrymal tumor rarely gives rise to any other than a very circumscribed abscess before it becomes transformed into fistula.

*Fistula lachrymalis* therefore is but one of the consequences of the tumor of the same name. It appears to me however that this fistula may in some instances be formed without having been preceded by tumor of the sac.

We may conceive for example, and I have now instances in point, that a loss of substance, either in consequence of certain operations, or we will suppose, from wounds, contusions, burns, or ulcerations, might destroy a part of the free portion of the lachrymal sac in such manner as to establish there an actual fistula. I believe, moreover, to have in two instances seen a fistula establish itself from the exterior to the interior, after the anchylops had already made its way out through the skin. However this may be, fistula lachrymalis is an ulcer

which communicates by an accidental opening with some point in the track of the tears. We should, therefore, by that definition, have to examine fistulas of the lachrymal ducts, those of the nasal canal, and fistulas of the lachrymal sac. But these last only have hitherto been the subject of special attention, and as to the others I have made a few allusions to them farther back. Fistulas of the lachrymal sac are sometimes *internal*, that is, that they may open into the middle meatus of the nasal fossæ, into the sinus maxillare or in the direction of the eye posteriorly to the palpebral commissure; but that they are almost always *external*. Under the last circumstances also, the cutaneous orifice, which, in ninety-eight times out of one hundred, is found in front of the lachrymal sac, may nevertheless occupy another position. I have in one case seen it on the prominence of the cheek, and in another case near the ala of the nose; a sinuous track of more than an inch thus separated the external from the internal orifice of the fistula. Ordinarily there is but one of these orifices; but sometimes the skin at the great angle of the eye is, as it were, cribbled with them. Frequently this orifice makes no projection, but even appears to be a little depressed; at other times it is found situated on the top of a kind of sac which is flabby or flattened, or occasionally more or less distended. It is not an uncommon thing to see it afterwards surrounded with fungosities, and presenting the aspect of an ichorous ulcer of bad character. In fact, nothing is so simple as the mechanism of a lachrymal fistula. The sac, for a long time distended in the state of tumor, is worn through (*s'éraillé*) or ulcerates; the inflammation extends sometimes suddenly, at other times by imperceptible degrees, to the neighboring layers, and an abscess is formed. Whether this abscess opens of itself or is opened by art, it nevertheless puts the cavity of the sac in communication with the atmosphere through the skin. If the ulceration makes its way directly to the skin, the fistula is direct or complete; if it spreads (*fuse*) or the contrary, either between the periosteum and bones, or among the other organic layers in the direction of the nostril, it is indirect and incomplete, and becomes an exception. We can readily understand how the os unguis, which is so thin and fragile, and the osseous plates with which this bone articulates, may ultimately become necrosed and carious, when we reflect upon their relations with such seats of inflammation and suppuration. As the treatment of fistulas in practice has generally been confounded with that of lachrymal tumors, I propose, in this place, to examine under one head the therapeutic of these two forms of the same disease. The treatment of lachrymal tumor and fistula has, at every epoch, occupied the attention of practitioners; after having been for a great number of ages almost entirely pharmaceutical, it became almost exclusively mechanical from the moment when the functions of the lachrymal apparatus became well understood. At the present day opinion seems to have taken another direction. Recognizing that the lachrymal tumor and fistula were the result of an inflamed condition of the nasal canal or lachrymal sac, practitioners finally asked themselves the question, whether the treatment of inflammation, modified according to the individual, and the peculiarities of the diseased region, ought not, in a great number of cases, to have the preference

over mechanical means. At the present time, therefore, before proceeding to surgical remedies, these affections are to be treated by resources of another character.

A. *Topical Applications and General Treatment.*—The first object of the surgeon ought to be to ascertain the causes, whether individual or constitutional, of the tumor or fistula. If the patient under treatment were affected with syphilis, scrofula, or scurvy, it would be necessary, before doing any thing else, to bring about the cure of these general derangements of the economy. It is to be understood, also, that tumors of the nasal passages, orbit or maxillary sinus, as well as any other disease in those regions, ought to be previously destroyed, should they have been the point of departure of the disease in question. If the affection should have developed itself in consequence of any disease of the skin, of the lips, or the Schneiderian membrane, it would also be necessary to commence by removing them. In those instances, quite common, of lachrymal tumor and fistula, which originate, as it has appeared to me, from an eczema of the upper lip and the encrusted condition of the opening of the nostrils, I have made use, with advantage, of a pomade composed of a gros of white precipitate to an ounce of lard, and sometimes also of another pomade containing eight grains of nitrate of silver to an ounce of lard. The parts affected are to be rubbed morning and evening with one of these pomades, taking care to remove the crusts previously, by means of emollient cataplasms. If, on the other hand, the case in question is one that comes under those tumors and fistulas originating from disease of the eyelids, I employ, before all other things, the means proper to cure this last. Influenced by the idea of an inflammation of the mucous membrane of the lachrymal passages, all the school of Beer maintain that we should treat it by debilitating remedies. It is for this reason that M. Mackenzie eulogizes general bleeding, leeches, and water, as a topical application and for the regimen, in the acute, and even also in the chronic state of the disease. M. Lawrence, still more specific, prescribes leeches to the internal angle of the eye and upon the tumor, and compresses wet with cold water as a resolvent.

The credit of this practice might equally well be ascribed to Demours, for this surgeon was in the habit of treating the diseased condition of the lachrymal passages by leeches and regimen; every where he speaks of having cured lachrymal tumors and fistulas of long duration without an operation. Emollients, procrastination, and cold lotions (*les lotions froides*—means of course, cold water,) were his favorite remedies, and we see by the consultations described in his great work, that it was the method also of his father. It is from not having been *au courant* on this subject with the history of the science, that some surgeons among us between 1820 and 1830, supposed that they were the authors of it. In fact, it goes still much farther back; for Manget, in 1693, wrote that fumigations by the nose and general treatment did exceedingly well with lachrymal fistula. Heister, who like Platner was aware that inflammation was the immediate source of this disease, and who compared the affections of the lachrymal passages to those of the urethra, treated them also by injections, bleeding, blisters, and regimen, which are almost

always sufficient he says, if there be not yet either ulceration or caries in the great angle. It is to be added, however, that before M. Gama, M. Guillaume, M. Paris, and some other military surgeons, (*Mém. de Médec. et de Chir. Milit.*, etc., t. XIV—XVI.) but few persons in France, except Demours, thought of combating lachrymal tumor by means of antiphlogistic remedies.

*Practice of the author.*—One consideration naturally suggests itself here; that is, to know to what extent debilitating measures are allowable under such circumstances. A regimen which is quite rigid, with some general bleedings, repeated application of eight, ten, fifteen, twenty or thirty leeches to the temple, mastoid processes or nasal angle, emollient cataplasms, cold topical applications, injections, or aqueous fumigations, continued for two, three, four, and six months, do not at first succeed but in a very small number of cases; afterwards this practice manifestly becomes more painful and dangerous than most of the surgical remedies now employed; from whence it follows that we should be wrong in according too much confidence to this kind of medication, and that we ought to consider well before adopting it. There are some lachrymal fistulas, moreover, which we have it in our power to cure without an operation, by means of a treatment better regulated, and less calculated to disturb the constitution. Thus, unless there are particular indications to the contrary, I would advise neither general bleeding, nor leeches to the temples, or behind the ears, nor a seton to the nape, which Fabricius de Hilden (*Bibl. de Bonet*, p. 394, 397,) recommends, nor a plaster of tartar emetic as eulogized by M. Weller, nor internal remedies; but I willingly employ, and have often done so with success, some of these remedies applied as near as possible to the parts diseased. From six to ten leeches on the track of the nasal canal and lachrymal sac, renewed three to four times in the space of a month, may be useful, if there be remaining a certain degree of inflammation and heat in these parts; the same remark applies to the fumigation of Manget or Louis, and to topical emollients. After this first period it would be necessary to recur, as was already the practice in the time of Rhazes, (*Guy de Chauliac, Traité IV.*, doct. II., chap. 2,) to the application of friction to the tumor or collyria between the eyelids. Upon the tumor we may apply either mercurial ointment, that of hydriodate of potash or ioduret of lead, and also temporary blisters. As collyria, we no longer employ the melange, lauded by Rhazes, but may make use with advantage of a lotion of sulphate of zinc, lime-water, a solution of nitrate of silver, and in fact any resolvent or styptic collyrium. Introduced into the lacus lachrymalis, (*le lac lachrymal*,) these liquids are absorbed there by the puncta lachrymalia, and thus tend to destroy the inflammation which constitutes the obstacle to the course of the tears. Le Dran, who had already employed liquid collyria under this form, and Mackenzie, who has substituted them for the injections of Anel, have obtained with them decided success; I have myself often used them and with very excellent effects. Nevertheless we must not deceive ourselves in respect to their efficacy. Though in the space of one year I have seen four women cured of lachrymal tumor and fistula under the treatment I have just described, I ought to add also that most of the other cases of the same

kind to which I had before been witness, have since returned to me, and convinced me that the cure was not permanent. We succeed by this treatment then only as an exception, and not eight times out of ten, as some persons at the present day have ventured to affirm; but what justifies trials of this kind is, that the surgical means at present known, in spite of their number, nevertheless still leave the treatment of lachrymal tumor and fistula very imperfect and meagre. In truth, the methods which have been from time to time eulogized for the cure of fistula and lachrymal tumor, having almost exclusively for their object the removal of a presumed obstruction, which is sometimes wanting, and which is only in fact the result of another disease, could not have otherwise than failed frequently.

These means, moreover, are so diversified, that in order to appreciate them properly, it is important to separate them into several classes. Thus, among those who have proposed them, some like Méjean and Anel, by means of catheterism and injections had no other object than the cleansing out of the nasal canal by penetrating through the lachrymal ducts; others, namely, Lecat, J. L. Petit, Cabanis, Palucci, Foubert, Jurine, Desault, Pamard and Scarpa, had especially in view the dilatation of this canal. Many persons recurring to the idea of Heister, have supposed it more rational to employ in those parts injections of various kinds, or to apply caustics, in the same way as is done for contractions of the urethra. A fourth group in fine, embrace the methods which, like those of Woolhouse, Hunter, Warner, and many others, were designed to establish a new route for the course of the tears. Among these methods there is a considerable number which would deserve to be consigned to entire oblivion; but as they are still employed by some practitioners, I think it advisable to make a brief review of the greater portion of them. In conclusion, I would divide the surgical treatment of lachrymal tumor and fistula, into four general methods, namely: the method of catheterism and injections, that of dilatation, thirdly, cauterization, and lastly, the method for establishing an artificial lachrymal passage.

B. *Catheterism and Injections.*—To believe Bianchi and Signoretti, Stenon, Valsalva, and Stahl, a veterinary surgeon mentioned by Morgagni, must have already made an attempt to penetrate the tear ducts, by means of very fine styles (*tiges*) more or less adapted to their object, until Anel attracted attention to this subject in 1716. Portal, (*Hist. de l'Anat. et de la Chir.*, etc., t. IV., p. 486,) in fact, asserts that we find the germ of this principle in Caus Julius, Plato, Septalius and Duret; but it is easy to perceive that Bianchi was deceived, and that Manget, in reality, is the only one who effected the passage of these ducts before the time of Anel. According to its partisans, catheterism of the lachrymal passages is called for, in tumors, fistula, simple obstruction, more or less complete obliteration, partial or general contraction, ulcerations and chronic inflammation of the lachrymal ducts, sac and puncta, as well as of the nasal canal. We may have occasion for it in order to introduce threads, tents, different kinds of meches, injections, and medicated liquids, and we may perform it either through the eyelids or the nares. This method presents two principal varieties: with it in fact we propose sometimes to clear out, sometimes to modify the interior of the diseased

ducts : in one, the object of the surgeon is evidently mechanical ; in the other, it is more physiological.

I. *The mechanical variety.*—*a. Process of Anel.*—Anel had two modes of treating affections of the lachrymal passages : sometimes he endeavored to clear them out (*les désobstruer*) by means of a very fine probe, at other times by the aid of injections that were either detergative or impregnated with some other medicated property.

1. *Injections.*—To introduce injections, Anel devised a small syringe of the capacity of two to three gros, terminating in a very fine syphon, to the point of which was adjusted a copper pipe much finer still. The patient was made to sit down fronting a well-lighted window. With the left hand for the left eye, and the right hand on the contrary for the right, the surgeon gently depresses the lower eyelid and inclines its free border forward. With his other hand he takes the syringe, introduces its point perpendicularly into the orifice of the tear duct, causes it to penetrate in this direction to the depth of about a line ; then placing it horizontally, he inserts the little copper syphon to the extent of two or three lines, then presses his thumb upon the ring which is at the posterior extremity of the piston, and cautiously forces forward the medicated liquid into the lachrymal sac. The inferior lachrymal punctum is preferred for this purpose, because the operation by that of the upper eyelid, would in fact be less convenient and less certain. Should the operator prefer placing himself behind the patient, he would depress the lid of the right eye with his right hand, and the lid of the left eye with his left hand.

He might also, were he not ambidexter, employ the same hand for both sides, by taking care to place himself in front for one of the eyes and behind for the other. At first the patient bears these manipulations rather badly : they produce in fact, in some instances, a good deal of irritation. It is only after having gone through with them for several days successively that he gets accustomed to them, and that they become as simple as they do trifling in pain. Saint-Yves and Heister also had recourse to injections, but they made them through the fistula. W. Blizzard (*Transact. Phil.*, t. LXX. ; *Journ. de Méd.*, 1781, t. LXXIII.) influenced like his predecessors, by the principle of clearing out the passage, proposed that mercury should be used in the injections.

2. *Catheterism.*—When the injection does not arrive at all, or but in very small quantities into the nasal fossæ, Anel recommends that we should immediately have recourse to the use of the probe. The operator, if to act upon the superior lachrymal duct, places himself behind the patient, gently reverses the eyelid outwards and upwards, with the left hand for the right eye and with the right hand for the left eye, seizes the probe with the other hand in the manner of a writing pen, perpendicularly applies the blunt point of the instrument on the lachrymal punctum, afterwards inclines its other extremity outwards and upwards, as if to carry it towards the external orbital process, cautiously advances it in, draws with his other hand the nasal portion of the lid inwards and towards the internal orbital process, as if to give him a vertical direction, immediately pushes in the probe in this last mentioned direction, taking care when meeting with the slightest obstacle, to raise it up, or

incline it a little either in front or outwards or backwards or inwards, in order to force it in fine to penetrate into the corresponding nostril; after which he withdraws it to have recourse again to the injections. The introduction of this probe is a delicate operation, which cannot be otherwise than fatiguing to the patient. It demands on the part of the surgeon an exact knowledge of the arrangement of the parts. The slightest fold, whether natural or morbid, is sufficient to arrest the instrument, which, in consequence of its small size and flexibility, is in reality incapable of overcoming the least degree of resistance. I will add that in every point of view it is a useless operation, for the lachrymal tumor and fistula are scarcely ever owing to a complete obliteration of the nasal canal. Moreover, if matters that would yield to the action of the probe could be the cause, they might be displaced full as well by simple pressure made upon the tumor. This pressure, which Richter recommends to be made from above downwards, and acting in the manner of injections forced into the urethra, would evidently have more efficacy than Anel's probe. Nevertheless the operation of catheterism continues to be performed and described, because, as will be seen farther on, some practitioners have applied it to the radical cure of fistula lachrymalis itself.

b. *Process of Laforest.*—Perceiving that injections and catheterism by the method of Anel were sometimes very difficult, and believing them moreover to be of unquestionable utility, Laforest and Allouel, nearly about the same time, proposed to penetrate into the lachrymal passages through the nares. To attain his object, Laforest had constructed small plain sounds curved into an arc, and catheters (algalies) of the same form, which were conical and open at their apex and terminated at their base by an ear (pavillon) furnished with a small lateral ring, designed to fix the instrument upon the side of the nose in the interval between the dressings. The plain sound, inserted from below upwards into the nasal canal, was intended to clear it out. After having removed this, Laforest replaced it by the hollow sound, which enabled him to inject by means of a small syringe, the liquids adapted to the nature of the disease. Laforest's sounds in our times have been modified by a number of surgeons. M. Gensoul has given them much more length and a curvature exactly shaped to that of the nasal canal. Those of M. S. Pirondi are of metal at their extremities, and gum elastic in the middle. Those of M. Serre differ only in their curvature from the catheters of M. Gensoul. With this last form of the instruments, catheterism of the nasal canal is in reality very simple, however little we may be practised in it, and modern practitioners are in my opinion wrong in so entirely neglecting to employ it.

II. *Physiological variety.*—The method of Laforest, like that of Anel, has been but seldom used for the purpose designed by the author; but other surgeons have endeavored to combine it with certain stages of the operation for fistula lachrymalis. Heister and Le Dran had already become satisfied that in a large number of cases, injections in the character of topical resolvents might render every kind of operation unnecessary. Briot, for example, as M. Champion also does, was still employing the process of Laforest with the most decidedly advantageous results. These injections,

either from above or from below, are in reality remedies that deserve to be retained. It is in fact obvious, that by directing medicated liquids upon the seat of the evil, we must sometimes succeed in dispersing it; only that the question arises whether by processes still more simple, we should not be enabled to attain the same object, and whether substances introduced through the nose by means of fumigations, as Manget proposed, or by inhalation, would not in the same manner pass into the syphon of the tears, as Monlac and Louis affirm they have caused them to do with success.

*C. Dilatation.*—When the lachrymal tumor has become ulcerated, or does not yield to the processes of Anel, Laforest, Louis and Le Dran, nor to general and local antiphlogistic measures, nor to anti-scorbutic and anti-syphilitic treatment, &c., it is admitted that it cannot be cured except by the operation, properly so called. It is not to be forgotten, however, that Maitrejean has seen two fistulas of the most serious character at the great angle of the eye get well spontaneously; that Demours rarely treated it by the cutting instrument; that the ancients, with their extensive battery (*tout leur échafaudage*) of escharotics, styptics and caustics, occasionally made some cures; in fine, that in our own times we have seen cases recover which had been treated only by local bleedings and the soothing regimen. This remark is so much the more important, as we may perceive thereby that all the different methods have occasionally succeeded in effecting a cure of *fistula lachrymalis*. As this disease is of a character to get well sometimes spontaneously, it is not therefore surprising that compression, already extolled by Avicenna, and for which J. Fabricius, de La Vauguyon, and Schmidt, constructed bandages of considerable ingenuity, and that tents of lint besmeared with an ointment of greater or less activity, and that leeches and emollient cataplasms, should, in a number of instances, have promoted the cure. In November, 1831, an adult man was sent to me at La Pitié by Dr. Grenier, in order to be operated upon for a lachrymal fistula, the existence of which, now of several months' duration, could be satisfactorily established. After procuring a canula, the fistula was found closed up, and when I saw the patient again, at the expiration of three months, the cure continued perfect. If leeches, or any other kind of medication had been employed, the curé would undoubtedly have been attributed to them. In 1836, I saw two similar results at the hospital of La Charité, and analogous facts have been related by MM. Moztehan, Caucanas, (*Journ. Compl. des Sc. Méd.*, t. XXXII.,) Demours, and Moulinié, (*Bull. Méd. de Bordeaux*, 1833, p. 138,) as well as by F. de Hilden, (Bonet, *Corps. de Méd.*, 394—397,) and Fichet de Flechy, (*Observ. Méd. Chir.*, p. 258.) Dilatation comprises two modifications: in one we act on the natural passages; the other, on the contrary, exacts an artificial opening for the introduction of the dilating body. Each of these methods, moreover, includes quite a considerable number of processes.

*I. Dilatation by the Natural Passages.*—*a. Process of Méjean.*—Méjean, perceiving that the employment of injections, and the clearing out of the lachrymal passages by Anel's probe, afforded only temporary relief, proposed to apply to the nasal canal the treatment by dilatation, which had been so long in use for contractions of

the urethra. By means of a fine probe, having an eye at its upper extremity to receive a thread, this author traverses the parts in the manner of Anel, and endeavors to insert the blunt end of the probe upon its arrival near the wall of the nares, into the groove or opening of the canula, (*sonde cannelée*), which has been introduced at the bottom of the lower passage, (i. e. by the nose,) in order to meet the probe, and to draw it through together with the thread attached to it; forming afterwards a noose with this species of seton he unites its two extremities around a pin, which is fixed into the cap or hair of the patient. At the expiration of one or two days, two strands (brins) of lint, folded double, are attached to the nasal extremity of this thread, in order to form a meche, which is besmeared with cerate or some other medicated pomade, and has another thread fastened to its free extremity. The meche is then drawn from below upwards through the nose, and as far as to the upper part of the lachrymal sac. Each day it is to be removed, and its size increased by adding one strand more of lint. To remove it we have recourse to the thread which retains it in the nose, and which between the dressings is to be kept fixed upon the cheek by means of a bit of court-plaster, (*mouche de taffetas*.)

By this process the treatment requires from two to three, four or six months, and the cure obtained is rarely permanent. Out of twenty patients thus treated there are rarely more than three or four in whom the disease does not reappear at the expiration of a few months. The method of Méjean, moreover, presents two difficulties which are not always easy to be overcome. The probe often gets stopped in the lachrymal sac, and does not reach the nasal canal until after long and fatiguing trials. Except we are much practised in the operation, we have generally considerable difficulty in bringing it under the inferior turbinated bone, into relation with the groove or eye of the canula, or in getting hold of it in any manner so as to bring it out.

*b. Process of Palluci.*—Palluci suggested that by introducing a small gold flexible canula (*sonde creuse*) instead of Méjean's probe, we might be enabled to pass through this canula a portion of catgut so fine, that the patient would drive it out in sneezing, when it could afterwards be made use of to conduct in the same direction a thread for the purposes designed in the process of Méjean. But it is obvious that this modification complicates the operation of the physician of Montpellier in place of simplifying it, and that it must be more easy to make our way through the lachrymal passages by means of a probe than with a canula.

*c. Process of Cabanis.*—Cabanis, a physician of Geneva, has suggested an instrument designed for seizing with greater facility Méjean's probe in the lower meatus, and which is composed of two palettes made so as to slide upon each other. Being perforated with holes which traverse the entire thickness of the upper palette, but go only to a certain depth in the body of the lower one, this instrument is first introduced below the inferior turbinated bone, (*cornet maxillare*.) By means of skillfully combined movements the probe is arrested in one of the holes of the two palettes united, by which it is soon securely embraced, (*exactement pincé*.) Cabanis also recommends, after having brought Méjean's thread through the

nose, that its extremity should be attached to the end of a flexible sound covered with gold-beater's skin, in order to conduct this sound with certainty through the lower meatus into the nasal canal, after the manner of Laforest.

*d. M. Bermond* of Bordeaux, who revived this suggestion in 1825 and in 1827, has very justly remarked, that in order to apply it, all that is required is to bring the conducting thread of Méjean to the outside by any mode whatever. Inasmuch as the instrument of Cabanis is not indispensable, and removes only a part of the inconvenience of the process of Méjean, and as the introduction of the probe and thread through the superior lachrymal punctum, counterbalances the advantages which might result from it for the subsequent introduction of a sound, in the manner of Laforest, surgeons have not adopted these modifications.

*e. Process of Guérin.*—Guérin of Lyons, having remarked that a simple thread left to remain in the superior lachrymal duct, excoriates and sometimes lacerates its palpebral orifice, recommended to bring Méjean's tent as high up as this punctum. Desgranges, who, like Guérin, finds it more convenient to reach the extremity of the probe through the nose by means of a small blunt erigne, than with the canula, or the palettes of Cabanis, adopted this suggestion, which Care on his part has more recently endeavored to render popular.

*f.* The process of this last physician, according to what he has stated to me and from what I have seen in the practice of M. Bougon, consists in passing from below upwards or from above downwards, by means of the instruments of Méjean, a meche of raw silk, composed of three, four or six brands, in order that the same may, while traversing through the superior lachrymal ducts and puncture, dilate them as it proceeds. When it has been passed from below upwards, one of its extremities is afterwards fastened to the forehead of the patient, or in the contrary case, upon the side of the nose. With the remainder of the meche we form a sort of peloton which is to be attached in the hair. A. Dubois appears to have several times followed this method, which I have also made trial of in two instances, and which differs in nothing from that of Guérin. Care's meche, by dilating the sound part only, without acting directly upon the diseased point of the organs it traverses, deforms and paralyzes the lachrymal puncta and their ducts. As I have not understood that experience has pronounced in its favor, I do not see any inducement to make any more trials with it.

*II. Dilatation by an artificial opening.*—When in order to dilate the nasal canal we penetrate by an artificial opening, we sometimes make use of temporary dilating bodies, and at other times of dilating bodies that are left to remain in the lachrymal passages.

*Temporary dilatation.*—For this kind of dilatation, surgeons make use of meches of lint, bougies, or metallic bodies.

*a. Meches and Setons.*—*1. Process of J. L. Petit.*—Petit was the first who endeavored to inculcate, that in fistula lachrymalis we ought to exert ourselves to re-establish the natural passage of the tears, much rather than to create a new one for them. His method may be considered as the source of all those that are employed at the

present day. An assistant placed behind the patient draws the temporal angle of the eyelids outwards, in order to stretch the parts; the operator then directs the point of a bistoury into the sac below the direct tendon of the orbicularis muscle, and makes at the great angle of the eye an incision of about six lines; glides in the place of this instrument a canulated sound, which he pushes with more or less force into the nose, through the nasal canal, and makes use of it to introduce a tent or conical bougie of wax, the upper extremity of which should be more or less dilated and supported by a thread. The operation is then terminated. The bougie is to be renewed or at least cleaned every day before putting it in its place, until the canal no longer furnishes any evidence of suppuration, that is to say during two, three, four, five, or six months. At a subsequent period, J. L. Petit thought that he could make a substitute for the canulated sound, by making a groove near the back and on the anterior surface of the bistoury, which would answer to direct the extremity of a blunt probe; but as a special bistoury would be required for each side, practitioners have generally paid no attention to this pretended improvement.

2. *Process of Monro.*—The approbation which the method of Petit first received did not prevent some surgeons from recognizing its defects. According to Monro it would be imprudent to open the sac without supporting its external or anterior wall. It is for this reason he proposes to introduce through the inferior lachrymal duct, a small sound, in order to distend it and to enable him to open it without wounding its posterior wall. Monro also recommends we should force through the nasal canal, by means of a shoemaker's awl, an instrument already mentioned by Guy de Chauliac, rather than with a sound; that by means of the scissors we should prolong the opening upwardly at the risk of dividing the direct tendon, and that in place of the bougie of Petit, we should make use of a small tent of lint or catgut. His precepts have been neglected. The wounding of the lachrymal sac posteriorly, besides being easy to avoid by the ordinary process, cannot involve any danger, whatever M. Rougier may say of it, while that of the tendon of the orbicularis is in itself a serious accident. The employment of an awl would expose us too much to be misled, and to the making of false routes, to render it possible that it can ever be preferred to the blunt-pointed probe and the canulated sound.

3. *Process of Pouteau.*—Introduced from above downwards, the bougie ultimately produces in the great angle an ulcer whose borders are reversed inwardly, and which sometimes leaves as a consequence a cicatrix which is greatly depressed. Pouteau having in vain tried the method of Méjean in a young lady, and not daring to propose the incision of the sac in the manner of Petit, decided upon passing his bistoury between the lower palpebral border and the caruncula lachrymalis, in such manner as to penetrate into the nasal canal without interfering with the skin. There resulted from it, says the author, only a slight ecchymosis, which itself was owing to his having made the incision too narrow. With the exception of one of the Pelliers, but few persons, however, have thought it advisable to imitate his example, though it has since been lauded by Leveillé, and

that M. Bouchet has employed it in one instance with success. The apprehension has been, that the conjunctiva would be too much irritated. Moreover, the inconvenience which Pouteau has proposed to remedy is reduced to so trifling an affair in the modern processes, that at the present day it is scarcely regarded.

4. *Process of Lecat.*—Lecat after having incised the sac in the manner of Petit, made use of meches of lint, which he introduced through the nasal canal from above downwards, by means of a cat-gut, a fine bougie, or Méjean's probe. In this respect he is the first who has endeavored to combine the method of Méjean with that of Petit; but as his meche also had a tendency to produce the reversion of the borders of the wound, so much dreaded, very little attention has been paid to the precepts that he has endeavored to lay down.

5. *Process of Canolle,* (*Mémoire sur l'état actuel de la Chir.*, par Montfalcon, p. 118, 1816.)—M. Canolle, when he thinks a seton indispensable, inserts a treble cord of a violin (chanterelle) which has been oiled, through the opening of the fistula, as far as into the nasal fossæ. When the patient feels an itching at the back part of his mouth, the surgeon explores this cavity, seizes the foreign body with the forceps and brings it outside; he then introduces a small bougie into the nostril corresponding to the side upon which the fistula is, until he has arrived behind the wall of the palate; he then withdraws this also with the forceps and proceeds to tie it to the extremity of the cord. He immediately withdraws the bougie through the nostril, then follows the cord; it is separated from the bougie, and a thread attached to its extremity. The cord drawn through the opening of the fistula, brings with it into the lachrymal passages the thread to which the seton is attached.

6. *Process of Desault.*—To obviate as much as possible the inconveniences of the preceding processes, Desault gives to the incision of the sac only two or three lines of extent. A canulated sound is immediately made use of to clear out the narrowed canal; a probe or a whitlow sound is then put in its place. A small silver canula, from twelve to fifteen lines long, conical in shape, and having a ring on the side of its pavilion, is brought from above downwards, as far as into the nose, by means of the probe which forms its axis or guide, and which is immediately afterwards withdrawn. The thread is then made to descend into it, and the patient forces out its extremity by making efforts to blow his nose; after which the operation differs in no respect from that of Méjean.

7. *Modification of Boyer.*—In order to be certain of making as much thread as we desire descend through the canula of Desault, we may, after the manner of Boyer, make use of a small probe of three to four inches long, bifurcated below, and terminated above by a ring; then afterwards, in order to extract this thread, have recourse to the little erigne of Deschamps, the dressing forceps, or merely make the patient blow his nose. If neither of these suffice we abandon it in the nose, when in almost every instance the mucosities ultimately draw its extremity through at the end of from twelve to twenty-four hours. In the contrary case, injections driven with a certain degree of force through the opening of the lachrymal sac, would not fail to expel it downwards.

8. *Process of Pamard.*—Pamard and Giraud, embarrassed by the difficulties of extracting the thread according to the method of Desault, devised, almost about the same time, an improvement which many surgeons of our day still make use of. It is a small elastic stem or watch-spring, terminated by a blunt point (*bouton*) and presenting an eye at its other extremity. The head of this spring is inserted into the canula of Desault. Having arrived under the inferior turbinated bone, its elasticity naturally carries it sometimes towards the opening of the nares, and sometimes under the lobule of the nose, where it is easy to secure it either with the finger or the dressing forceps. Nevertheless, when the spring is not well tempered, and even sometimes when it is perfectly constructed, its extremity cannot be disengaged from the inferior meatus of the nasal fossæ but with a considerable degree of difficulty.

9. *Process of Jurine.*—In order to leave as little deformity as possible in the angle of the eye, Jurine performed the operation with a small trochar of gold, and whose canula is pierced near its point. It is plunged in as far as the nose. After having withdrawn the stilett we introduce Pamard's spring; in other respects we conform to the rules established farther back. If, in spite of its apparent simplicity, this process has not been adopted, it is because, in reality, it is more painful and less easy than many others. It will always be more rational to open the lachrymal sac with a bistoury than with a trochar. And then the process of Pamard is preferable to that of Jurine.

10. *Process of Fournier.*—An ingenious modification of the operation of Petit, and which I am astonished to see omitted in our modern treatises, is the one which has been proposed by M. Fournier of Lempde. This physician proposes we should attach a small shot or grain of lead to the conducting thread of Méjean; drawn down by its weight this shot traverses the canula of Desault, and falls of its own accord into the interior of the nose, from whence the patient readily expels it by merely taking the precaution to incline his head forward. G. Pellier had already, with the same purpose, made use of the end of a leaden sound.

11. *Process of Janson.*—M. Janson (*Compte Rendu de la Prat. Chir. de l'Hôtel Dieu de Lyon*, 1822, p. 51) anoints the lachrymal sac and clears out the nasal canal with a whitlow sound, whose notch enables him to direct a catgut into the nasal cavities; he then proceeds to seek for this last with a blunt-pointed erigne; on the second or third day he substitutes for it a silk thread, which serves to conduct from below upwards a small meche of cotton, the size of which is gradually augmented until the cure is completed. This process has the advantage of leaving nothing to appear outside but the portion of thread of flesh color, which, from the great angle of the eye, is concealed under the head-dress of the patient. "It would be difficult for me," says the author, "to relate the number of fistulas operated upon in this manner; but what we may assert as indisputable is the superiority that may be accorded to it over every other method whatever."

12. The editors of Sabatier have also remarked that the combination of the methods of Méjean and Petit may be effected without the

array of instruments brought into use by Desault, Pamard, Boyer, and M. Roux. What need is there, in fact, of introducing successively into the nasal canal, a sound, a probe, a canula, and then a watch-spring? Why not be content to place the thread in the conducting instrument, and to glide this last into the nose as soon as the *lachrymal sac* is incised? The species of spring acting in the canula in such manner as to transform itself into a hook, which was proposed in 1806 by M. Benezech, in order to extract Méjean's probe more readily, would have no advantage over most of the other means which have been hitherto pointed out, and consequently does not require any farther notice.

13. *Process of Jourdan.*—Apprehensive that the whole extent of the evil might not be laid bare, and desirous of avoiding the cicatrix of the integuments, M. Jourdan, imitating Pouteau, has proposed to open the lachrymal sac throughout its whole length, behind the internal commissure of the eyelids within the caruncula. M. Vésigné is doubtless wrong in asserting that it would be generally impossible to conform to this advice; but it is nevertheless true that the process of M. Jourdan offers no advantage over the others, that it would incur the risk of wounding the internal extremity of the lachrymal ducts and of dividing the muscle of Horner, and that it would present more difficulties than any of those that are in daily use.

14. *Process of Manec.*—Should the introduction of the conducting thread of Méjean still present some difficulties, we might readily surmount them by means of the instrument devised by M. Manec. It is a sort of spear-pointed sound, introduced through the nose from below, upwards into the nasal canal, and as far as to the palpebral angle. The spear point is then made to pierce through the anterior wall of the lachrymal sac, and its eye is made use of to draw the thread through the nostrils. What will hinder this ingenious modification from being generally adopted, is the difficulty that many practitioners experience in penetrating with any instrument whatever, into the nasal canal through the inferior meatus.

b. *Bougies and Cylinders.*—1. *Process of Scarpa.*—While in France they endeavored to give popularity to the seton of Méjean, the physicians of Germany, Italy, and England, limited themselves to a modification of the method of J. L. Petit. Scarpa, having no more apprehension of dividing the direct tendon than his pupil, M. Luzardi (*Journal de Méd. de Nancy*, 1825, p. 234) has since had, advises that we should insert into the lachrymal sac and nasal canal, which he first cleanses by means of meches besmeared with red precipitate or nitrate of silver, a leaden pin or a species of conical nail, terminated above by a flattened head, and more or less inclined downwards, in order that it may accommodate itself to the form of the inner angle of the eye. This pin (clou), which B. Bell kept in for eight to nine weeks only, ought to be withdrawn from time to time to be cleansed, and reintroduced immediately afterwards. During the first weeks the surgeon himself attends to this duty, and injects with warm water into the lachrymal passages before replacing there the metallic stem, which Scarpa calls the tear conductor. At a later period the patient has no need of any person to attend to the dressing. As soon as the tears flow freely into the nose without

any obstacle, and that the pin ceases to be covered with purulent matter, we may, in fact, dispense with its employment. Nevertheless, it is advisable to continue it for some weeks longer, in order to be more certain of preventing a return. "There are some patients," says Scarpa, "who are so little annoyed by it that they cheerfully carry it all their lives."

2. I have seen at Paris *Dubois* and *M. Bougon*, successfully use a leaden pin, which only differs from that of Scarpa in having its upper extremity merely curved in the form of a hook, in place of being flattened like the head of a nail. After having employed both I give the preference to Scarpa's pin, to which I allow a length only of ten to twelve lines, and to whose point I give a strong curve, while others prefer to have this end in an enlarged base.

3. *Process of Ware*.—There are those who prefer a silver pin to the tent that I have just spoken of. Ware, for example, has given rise to the adoption by many surgeons in England of a silver pin, which in other respects is in almost every point similar to that of Scarpa. After having lauded the canula of Wathen, Ware has substituted for it the pin in question, and maintains that it conducts the tears into the nose by a sort of attraction. We thus perceive that the process of Scarpa was entirely modelled upon that of Ware. Demours, before having adopted the gold canula, employed a silver pin sixteen lines in length and curved into a hook above.

4. *Process of Larrey*.—M. Larrey in his turn substitutes for these instruments a portion of catgut, three to six lines in length, fixed on a plate or sort of button made of taffeta of flesh color, in such a manner that the whole has considerable resemblance to the little candle, known under the name of veilleuse. This instrument is removed, cleansed, and reapplied every morning. Adherent by its head upon the skin, and requiring only a small aperture, it is scarcely perceptible at the great angle of the eye and causes no annoyance to the patient.

5. *Beer, Scarpa, and Weller*, eulogise also small bougies or catgut, but under another form.

D. *Permanent Dilatation.—a. Permanent Canula*.—According to Louis, Foubert had proposed to place permanently into the nasal canal a silver canula about an inch in length, conical in shape, and terminating inferiorly in the form of a spoon. Bell and Richter have also mentioned this canula on the authority of La Faye, who himself mentions canulas of gold, silver, or lead, left in the canal as a common practice, and without citing Foubert. But Louis having formally censured it, it was scarcely any longer spoken of by the surgeons of that time in spite of the efforts of G. Pellier, who in 1783, gave himself out as the inventor of it, relating in his work facts which plead strongly in its favor. Pellier moreover had modified it very ingeniously. His, which is of less length than that of Foubert, was made to terminate above in a border, and presented in the middle another border; so that being once introduced it became impossible for it to ascend or descend. It does not appear moreover, that it has ever fallen into complete oblivion. Distel says that one of his patients carried one for more than fifteen years, and that he took one of tin from another which had been in place for forty years. I perceive

also by a thesis sustained in 1802, that at the Hospital of Strasbourg no other method than this had been pursued for a long period. M. Marchal, the author of this thesis, furnishes nine cases which are altogether of a conclusive character. In Germany it was employed also by Himly and Reisinger; but it had been almost forgotten in the schools of Paris when Dupuytren recalled the attention of practitioners to it, by giving it only one border instead of two. This border, concave inwards, where it presents a circular groove, is arranged in such manner, that in order to withdraw the canula if any accident requires it, it is sufficient to introduce into its interior the beak of an elastic forceps terminated by two little hooks, whose points turned outwards readily draw it from below upwards. I will however add, that if Ansiaux is to be believed, these modifications of the canula of Pellier had been proposed by Giraud even at the Hotel Dieu, ten years before Dupuytren used them, and that they were adopted at Liege in the year 1806. In place of presenting a border in the middle, that of M. Brachet has the second one at the lower extremity. M. Taddei has approached much nearer than any other person to the views of Pellier, by recommending that we should place a slight border below its upper third. M. Grenier, who considers that the canula only escapes in consequence of its ceasing to be pressed upon in a sufficient degree by the nasal canal, has proposed to construct one which may be contracted when it is compressed, and which on the contrary acquires a larger calibre, like a spring, as soon as it is left to itself. In the year 1756, Tillolig considered that it would be advisable to withdraw it through the nose at the expiration of a few months; while in 1781, Wathen proposed to fix a thread to its upper extremity in order to hinder it from descending, and M. Nicault recommends that we should make use of a cone composed of several plates of sheet lead rolled around each other. Other modifications still have been made to the canula of Pellier. Some persons have proposed to perforate it with holes, the better to prevent its slipping. M. Bourjot finds that of Dupuytren too long, and makes the objection to it, that it ultimately rests upon the floor of the nasal fossæ. M. Blondlot is in favor of a bellied canula, in order to dilate the canal gradually and imperceptibly. The one that I employ terminates in a blunt point, and not like the beak of a pen, which would expose it too much to the risk of chafing the wall of the nasal canal or perforating the bones; but practice teaches us that the form of the instrument is not a matter of importance in these cases.

*b. To introduce the canula* we may, after the manner of Dupuytren, make use of a steel, silver or gold stilett, a sort of lever bent almost into a right angle, the lower portion of which, adapted to the canula, is bounded by a shoulder more or less prominent, and the handle of which, while it is more or less flattened, has a length of from two to three inches. As soon as the canula has penetrated the little wound, we fix it in this point by means of the nail of the forefinger or thumb, during which the stilett is withdrawn. The patient is then recommended to breathe out with force, and if the air is driven through the angle of the eye, the operation is well performed.

A bit of plaster or taffeta keeps the wound united over the canula, in such manner that its cicatrization frequently is completed as soon

as the following day. Ansiaux asserts that before introducing the canula, it is advisable to clear out the nasal canal with a sound or a probe. An incision having been made into the sac, he introduces a blunt probe through it as far down as into the nose, and afterwards makes use of this probe as a stilett to conduct the canula into the nasal canal, the cleansing of which by means of the proper topical applications he also recommends, as Delpech (*Clin. Chir.*, t. II., p. 433) had recommended it to be by cauterization, a practice which is likewise followed by MM. Bouchet and Lusardi, (*Journ. Méd. de Nancy*, 1825, p. 235.) M. Blandino has revived at Paris the modification of the Belgian surgeon, which M. Taddei had also believed himself the author of. M. Cloquet, who does not leave the canula permanently in, until after having made use of tents during the space of some days, and M. Chaunet and M. Bérard, who previously dilate the canal by means of bougies or catguts, gradually increased in size, have also in these respects, gone farther than Ansiaux. To penetrate upon the inner side of the eyelids, as M. Vésigné wishes, with a view of avoiding a cicatrix, would be truly superfluous, and this assuredly is not a case for conforming to the precept of Pouteau. With a view of rendering the operation still more simple and prompt, M. Daniel has contrived a sort of trochar or stilett, terminated in a lancet point, to carry the canula into the nasal sac in such manner that the operation is thereby reduced to one stage. This instrument, which the author has shown to me, and which is applicable to the most simple cases, would, like that of Jurine, possess the inconvenience of not making a sufficiently extensive incision of the skin, of fraying out with too much facility a false route into the substance of the walls of the canal, and of not permitting the employment of means rendered necessary by a variety of circumstances difficult to be determined beforehand.

c. The canula may be of *silver, gold or platina*; the important point is, that it should possess some degree of solidity, and that it cannot be easily injured. Its size and length ought to vary according to the subject. It is necessary that it should adapt itself as nicely as possible to the nasal canal, and that it should pass a little beyond the lower extremity of that passage. Consequently we ought to recall to mind, that in an adult this passage is from five to eight lines in length, and from one to two lines in breadth. It is also advisable that it should be slightly concave posteriorly, and on its inner side, and that its point, if it is cut in the shape of a pen, should pass beyond the antero-external rather than the nasal wall of the canal which it occupies.

d. *To adapt its proportions to the stature* of the patient at the different epochs of life, M. Grenier has proposed a method which, as it appears to me, attains this object with sufficient precision, viz., that the length of the nasal canal is to be estimated by a line drawn from the point where the incision is made in the great angle to the superior depression of the ala of the nose, at the union of the lower border of the nasal bone with the ascending process of the superior maxillary bone.

e. *Appreciation.*—The use of the canula having been adopted to great extent in France, requires in this place that I should examine

with some care its importance and its inconveniences. Many objections have been made against it. It is, they assert, a foreign body which, by its presence, causes irritation to the system, produces cephalgia and pains in the face and in the nose, erysipelatous inflammations, phlegmons abscesses and ulceration in the great angle of the eye. Frequently it makes its way upwards under the integuments, and M. Darcret relates twenty-seven cases where its extraction became indispensable. In other cases it falls into the nasal fossæ, and the operation is, so to speak, abortive. All these inconveniences were pointed out by M. Bouchet in 1816, and presented in a correct point of view, in Italy, by M. Pl. Portal. Like Delpech, (*Clin. Chir.*, t. II., p. 433,) M. Ouvrard, (*Méd. Chir.*, p. 265,) Béclard, (*Clin. des Hôp.*, t. IV., p. 106,) and MM. Cloquet, Bourjot and Laugier, (Diday, *Thèse de Concours*, Janvier, 1839,) I have seen it pass through into the vault of the palate. It is even said that, in one instance, it fell into the trachea, and that it became necessary to have recourse to tracheotomy; but this is a statement that requires confirmation. The canula may also get involved in the sinus maxillare, (Ouvrard, *Méd. Chir.* 265,) or into the substance of the alveolar border.

Mucosities and powders that many persons put in their nose, ultimately obstruct it and close up its orifices. Finally, when we are obliged to extract it, we find ourselves under the necessity of performing an operation more difficult than that of the fistula lachrymalis itself. If the instrument glides between the maxillary bone and the soft parts of the face, instead of passing into the nasal canal, as I have seen it do in two instances, it will cause symptoms more or less serious, without having the slightest beneficial effect upon the fistula properly so called. The same result takes place if we force it into the neighboring sinus, or get its point entangled in the walls of the canal, or if it descends between the bones and the membrane of this passage, or in a word, if it does not exactly follow the natural channel of the tears; it is also clear that a large canula cannot be conducted without danger through a canal which is too narrow, and that if we insert a small one into a very large canal the operation will equally fail of success. In answer to these objections I may reply: it is for the surgeon to be prepared to avoid these different mistakes, or at least when he commits them not to throw the blame upon the operative process. In the other methods it is necessary to renew the dressing every day for several months, and there are none of them that have not equally caused cephalgia, erysipelas, &c. By the process of Dupuytren some seconds only are required to terminate the operation. The patients are cured almost as soon as they are operated upon; no dressing, and no particular care is necessary; most of the patients immediately after resume their customary occupations without thinking that they carry a canula in the great angle of the eye. We obtain in this manner from twelve to fifteen cures out of twenty cases. A young woman who had the canal so narrow that in order to introduce a canula of very small diameter, I was obliged to employ a very considerable degree of force, got well, however, after a slight degree of cephalgia, during the space of three days; I was, so to speak, obliged to pierce (*tarauder*)

the canal in order to force in a canula in a young man aged twenty-one years, who, nevertheless, was re-established in his health on the following day; I kept him at La Pitié, and no accident supervened. The worst that can happen after all is, that we may be obliged to withdraw the canula; for that purpose we have to find the upper opening of the nasal canal, and to seize hold of the foreign body with a small pair of forceps. When any difficulties are encountered, the stilett of Dupuytren with a double hook, the little hook of M. Cloquet or M. A. Stevens, or better yet, the stilett of Caignou, with a double spur, will readily overcome them. We may also make use of a dissection forceps, one of whose extremities has been made to terminate on its inner side by a small curved point. With one of these instruments, the beak of which is placed in the groove of the border, or equally well below the point of the canula, we readily bring it out by making it follow the route which it had already passed. Up to the present moment I have removed this instrument a great number of times, and the dissection forceps ordinarily have, in most instances, sufficiently answered my purpose. We will remark, moreover, that after the extraction of their canulas, patients are absolutely in the same condition as those who would have been treated during the same lapse of time by the dilating method of Petit, and that many then find themselves radically cured. In two patients the canula, which had descended more than half its length into the nose, could not be seized hold of through the lachrymal sac. An ordinary probe bent into a hook, and directed underneath the inferior turbinate bone, enabled me to extract the canula through the nostril. I have also seen that the canula no longer existed in many persons who believed they still had it, and in whom the fistula or the tumor had become re-established; for it does in fact often disappear without the patient being aware of it. I have seen surgeons give up the idea of extracting it from the impression, as I myself have been in two instances, that it had become incrusted in the bones. If we perceive nothing in the nose, if the canal is free and we strike against nothing above, the canula no longer exists there; it is useless to look for it. In conclusion, therefore, the canula is not applicable to all cases. When the nasal canal has deviated from its normal direction, has become narrowed in one part or in another in consequence of an exostosis, and its walls are greatly approximated (*resserré*) and indurated; when it contains ulcers or is the seat of lesions of a still more serious character, it is better to recur to the seton of Méjean, or to some other process better adapted to the case.

Enlightened by a longer experience, I am in fact at the present day obliged to admit that cures by the canula are infinitely less numerous in reality, than I had at first supposed. The error into which many practitioners in this respect have fallen, is owing to the greater number of patients, under the belief that they were cured on the day after the operation, or the day after that, have not afterwards been seen by the surgeon. Desirous to know what had become of them, I have followed them up or caused them to be followed up as much as could be done. I have by this means ascertained that the canula very often ascended into the lachrymal sac during the first four months; that in a great number of cases, it escaped through the nasal fossæ before

the tern iation of the second year ; that those that remained in their place, became changed, dissolved and destroyed, to such extent as to be of no value ; that they sometimes break, (Champion, *private correspondence*, 1839,) become sometimes filled up by a sort of blackish colored putty similar to sulphuret of silver, sometimes by stony or sandy concretions ; at other times by lymph, concrete mucus, membranous folds, &c., in such manner that at the end of two or three years, for example, there are few patients who remaining cured preserve it unaltered in the nasal canal ; that it merits in fact almost all the objections that Ware makes against it. It is, moreover, in fine, one of the most uncertain remedies that surgery possesses.

*f. Operative Process.*—Whatever may be the method that is preferred in operating for fistula lachrymalis, there is one stage which at the present day everybody performs nearly in the same manner ; I mean the opening of the sac and the catheterism of the nasal canal. In order to arrive with the greatest certainty possible into the canal, the operator causes the eyelids to be stretched by recommending to the assistant to draw them towards the temple. With the forefinger corresponding with the diseased side, he seeks in the great angle the anterior lip of the lachrymal groove. After having forced out by slight pressure the mucosities (*l'empâtement*) of this part, should any exist, he provides himself in his other hand with a straight, solid and narrow bistoury, the point of which he directs behind the angle of the forefinger in order to plunge it obliquely inwards, backwards and downwards. Having thus arrived in the sac, he immediately raises up the handle of the instrument towards the top of the eye brow, (*la tête du sourcil*,) in order to descend perpendicularly into the nasal canal. He then takes a stilett armed with the canula, if he wishes to follow the method of Foubert ; a canulated sound or a probe, if he proposes to imitate Petit or Desault, and directs the extremity of one of these instruments upon the back or anterior surface of the bistoury in such manner that this last, in coming out, serves as a conductor to the other. When the opening of the fistula is sufficiently large to permit the passage of the canula or sound, the bistoury is not indispensable. In other cases we sometimes comprise the ulcer in the incision, sometimes leave it above, below or to the side ; in other cases we pay no attention to it : if it is surrounded with fungosities and that they are troublesome, we in the first place remove them, and afterwards proceed according to the usual rules. When we wish to penetrate into the nasal canal from below upwards, that is through the nose, the operator holding the sound like a writing pen, with its concavity turned downwards and outwards, introduces it into the nostril to the depth of about an inch : now raising a little the pavillon of the sound, in order that the apex of this instrument may arrive under the inferior turbinated bone and glide upon the nasal wall, he gently draws it forward to the distance of six or eight lines from the opening of the nostril. He then turns its concavity little by little outwards and upwards ; then by an oscillatory movement skilfully managed, he endeavors by feeling about to make its beak penetrate into the orifice of the nasal canal. We thus arrive without any very great degree of difficulty as high up as to the angle of the eye or even into the lachrymal sac. Force is never required in these cases. Re-

sistance can happen only from the bad direction given to the instrument or some anatomical peculiarities. In inclining the sound too much downwards, upwards, inwards, or outwards, we force its apex against the opposite wall or the periphery of the lower orifice of the canal. The efforts which would then be made, would lead to no result except that of penetrating into the sinus maxillare or orbit, or that of fracturing the inferior turbinated bone, which might be so low down and so strongly incurvated that its free border almost immediately touched the floor or the outer wall of the nose, and thus transformed the lower orifice into an actual canal.

D. *Cauterization.*—Before the channel of the tears was perfectly understood fistula lachrymalis was treated by injections, or by tents or meches of lint introduced into the lachrymal sac, and especially by the application to this part of escharotics and actual caustics. These different methods are already described with a sufficient degree of clearness in the works of the Greek physicians, those of the Arabs, and the authors of the middle ages; only that it was under the same character as the treatment of every other fistulous ulceration. The ignorance which then existed in relation to the anatomical arrangement of the lachrymal passages did not allow them to consider it in other point of view. What Guy de Chauliac says of it proves that Sprengel was deceived in attributing to the ancients the idea of injections of the nasal *canal*. For more than a century mention had scarcely been made of cauterization, when, in 1822, M. Harveng proposed to create by it a new method of treatment. It was immediately recollected that the nasal canal was somewhat analogous to the urethra, and that its contractions might possibly be submitted to the same kind of medication. At the present day we have two modes of performing cauterization of the lachrymal passages: in one we cause the cauterizing material to be inserted from above downwards, while in the other it is introduced through the nasal fossæ.

*Through the Lachrymal Sac.*—1. *Process of Harveng.*—M. Harveng proposes that after having opened the lachrymal sac, we should introduce through a canula a cautery heated to a white heat, or a meche besmeared with nitrate of silver upon the contracted points of the nasal canal; that we should repeat this one or more times according as may be required; that we should proceed in fact as in the treatment of affections of the urethra by Ducamp. According to M. Vial, whose thesis did not appear until 1824, Mortier, of Lyon, had a long time since promulgated the same idea, which is also attributed to M. Janson, and which M. Taillefer, who also believed himself the author of it, revived in 1827. But it is in reality a mode of treatment which is very ancient, since Heister had already advised to touch the nasal canal with nitrate of silver. Formerly it was adopted by many practitioners. G. de Salicet made use of the green ointment (*onguent vert*). G. de Chauliac, who prefers the red-hot iron, proposes that we should protect the eye during the operation either by means of a canula, as Alcoatin does, or with paste, as Jésus recommends, or by means of a silver or brass spoon, as practised by Théodore.

2. *Process of Deslandes.*—In the month of May, 1825, M. Des-

landes published another process to effect the same object. An ordinary probe is first introduced into the nasal canal in order to remove any obstructions and to clear out a passage for the caustic-holder; we then glide in its place a second instrument of the same form, having two parallel grooves upon its vertical branch, and which are filled with melted nitrate of silver; this is then turned on its axis in order that the whole circumference of the canal may be cauterized, which finishes the operation.

*Through the Nasal Fossæ.*—I heard in the year 1824, that M. Gensoul, whose labors were published at a subsequent period, dispensed with the opening of the great angle of the eye, and that he applied the nitrate of silver through the lower orifice in the nasal fossæ. M. Bermond, of Bordeaux, in 1825 inserted in the Journals a memoir on the same subject. M. Valat made some mention of it in his thesis, in 1826, and M. Ratier, who, without doubt, was unaware of these different attempts, announced, in 1828, that he hoped to apply the method of Ducamp to the treatment of fistula lachrymalis by penetrating through the lower orifice of the nasal canal.

These different surgeons first proposed to ascertain the place, form and extent of the disease; then to direct the caustic upon it with certainty and ease. In penetrating by the great angle of the eye, as is recommended by Mortier and MM. Harveng and Taillefer, the operation ought not to be attended with any difficulty; by the other method, on the contrary, we must begin by making ourselves familiar with the process of Laforest.

3. *Process of Bermond.*—After having brought the conducting thread of Méjean outside through the natural passages and without any previous incision, M. Bermond without paying any attention to the ulceration of the great angle fixes the thread to the noose of a meche besmeared with wax, which he then draws into the nasal canal in order to receive the impression of the diseased surface (*l'empreinte du mal*). By means of the thread which is attached to the free extremity of this species of bougie, he draws it out through the nose, and puts in its place a tent made of some strands of lint covered with a solid paste, and rendered caustic in the part which is to correspond to the contraction. This process has but one inconvenience, that of requiring the previous introduction of a thread through the lachrymal punctum, duct and sac. We perceive that it is the seton of Méjean rendered caustic; but it might evidently be simplified if, in place of following exactly the natural passages, as the surgeon of Montpellier does, we adopted the precepts of Petit and all the moderns for managing the conducting thread.

4. *Process of Gensoul.*—A small catheter having a curvature exactly similar to that of the passages into which it is to be introduced, is first directed under the inferior turbinate bone and as high up as into the nasal canal, in order to verify the seat of the disease, which is immediately after attacked with a caustic-holder charged with nitrate of silver. More than three hundred patients have been treated in this manner by M. Gensoul, some with the most perfect success, others with only partial results, and many without any advantage at all. In order to give to his stilett and canulas the form that is most convenient, he has taken the exact impression of them by means

of the fusible *alliage* of Dariset. Instruments improved after these principles were shown to me in 1825, by Dr. Blanc, and I was really surprised to see with what facility they could be introduced into the tear duct.

*Appreciation.*—In proposing to cauterize the nasal canal, the surgeons whom I have just named have had no other object in view than to apply the method of Ducamp to the lachrymal passages. It is true, that if cauterization is applicable to the contraction of the urethra, it may also be so for the diseases of the nasal canal; but it appears to me that in the two cases, that neither the action of the medicament that we employ nor the nature of the affection that we propose to destroy, have in all cases been clearly understood. Like those of the urethra, the contractions of the nasal canal are usually kept up by a chronic phlegmasia more or less extended, or more or less accurately circumscribed. In no case could fistula lachrymalis have ever originated from the spasmodic contraction, mentioned by Janin, and to which Richter has given so much importance. Nor does the affection of the eyelids, mentioned by Scarpa, become the source of it except by propagating itself to the lachrymal sac and as far as into the nose, where it causes an engorgement and obstruction of the mucous membrane which may produce an obstacle to the passage of the tears. In other words, lachrymal fistula and tumor depend upon an induration and thickening or a simple chronic phlegmasia of some portion of the lachrymal syphon: but in applying nitrate of silver on organs that have been thus changed, it is not by producing eschars there and in *burning* them that we cure them: but it is by dissipating the inflammation, and by neutralizing and destroying the *stimulus* and the *germ* (epine) which keeps it up, and by bringing about the resolution of the morbid engorgement. It hence follows that nitrate of silver is the only *caustic* which can be reasonably employed, and that those impressions which have so much occupied the attention of practitioners are in a measure useless; that the principal object is to make the caustic arrive in the upper part of the nasal canal when we introduce it from below; and near its lower extremity, on the contrary, when we follow the opposite route, in order that we may make it act upon almost the entire extent of the passage. All the precautions, moreover, that we might take in order to prevent this general action would not attain our purpose. As soon as the nitrate of silver is in contact with the living and moist tissues, it melts and soon diffuses itself in such manner that it is only necessary in the nasal canal to touch a single point to ensure that all the others shall immediately feel its influence. What I here say of cauterization I might apply equally well to dilatation. When a meche or a solid stem is kept either temporarily or permanently in the nasal canal it cannot in my opinion be of any service, except in two ways: 1. By transmitting to the affected surfaces medicated substances that are calculated to destroy the disease; or, 2. By compressing from within outwards the whole circumference of the altered passage. In these cases we cure not by dilating, but in fact by an actual resolvent compression, in the same way as we cure œdema, certain eruptive diseases, erysipelas, &c.

*E. Establishment of a New Canal.*—We find in Aetius and Paul

of Egina, that Archigenes had already pierced through the os unguis with a drill, in order to compel the tears or matters to pass into the nose. Sabor Ebn-Sael, quoted by Rhazes and Avicenna, also eulogizes this resource, which is censured by Mesué. We have every reason to believe that Abulkasem, Roger, and the Alcoatin mentioned by Guy de Chauliac, who all applied the red hot iron on the os unguis, effected the same purpose. Certain it is that their predecessor Celsus speaks of the extirpation of the sac and cauterization of the os unguis as a usual practice, and that G. de Salicet advises when the bone is diseased to cauterize it in such manner as to allow the tears to run into the nose, and that this also was the method of J. de Vigo. Almost entirely forgotten for many centuries, this method was again brought into repute by Woolhouse. It is the only, or almost the only method of treating fistula which was employed up to the time of Petit and Méjean.

1. *Process of Woolhouse.*—The operator makes at the great angle of the eye a semilunar incision which includes the tendon of the orbicularis muscle, opens freely into the lachrymal sac, or even according to Platner or M. Malgaigne extirpates it, and lays bare the os unguis; he immediately fills the wound with lint and does not finish the operation until at the expiration of twenty-four hours, or even two or three days, in order that he may be no longer embarrassed by the blood. A sharp probe is then plunged from above downwards, from without inwards, and slightly from before backwards, as far as into the nasal fossæ, through the lachrymal groove or lower part of the os unguis. A meche of lint or small conical canula is afterwards introduced into this opening in order to prevent its closing; then after its borders are cicatrized and become callous, we introduce a gold canula, which is a little contracted in its middle part, in order that it may not escape either inwards or outwards, and that we may leave it there permanently.

2. *Process of St. Yves.*—Saint-Yves, who had remarked that the process of Woolhouse was almost constantly followed by erosion or reversion of the eyelids, perceived that this inconvenience might be avoided by respecting the tendon of the orbicularis muscle in making the incision at the great angle of the eye. He moreover prefers like Guy de Chauliac to perforate the os unguis with the actual cautery, in order to obtain an actual loss of substance.

3. *Process of Dionis.*—Lacharrière, Dionis, and Wiseman, also recommend the employment of the hot iron, which they apply to the internal wall of the lachrymal sac through a protecting canula made in form of a funnel, the first idea of which funnel appears to go back as far as Alcoatin.

4. *Process of Monro.*—Scobinger, Monro and Boudou made use of a trochar for the perforation of the bone, and had less apprehension than Woolhouse of wounding the ethmoid. Ravaton believed that he could arrive at the same result by means of a curved forceps with which he fractured the os unguis to a considerable extent, followed by a leaden canula. But none of these methods can be followed by a perfect cure, "for very soon after the aperture of the bone fills up," says Guy de Chauliac, "and nothing can any longer run into or pass off by the nostrils." Whether the artificial opening

is kept free by means of a meche, or tent, or by a canula analogous to that mentioned by Platner, or a little dilated at its two extremities, like that of Lecat or Pellier, or still shorter or more contracted, like that which Dupuytren used, for example, in the treatment of Ranuncula, or by the hooked forceps of Lamorier, &c., it nevertheless almost immediately afterwards closes up; and it is rare that the contracted canula of Woolhouse keeps a sufficiently long time in its place to render the new passage permanent.

5. *Process of Hunter.*—Hunter believed that he could succeed better by carrying away at once a disk of the os unguis, and the two membranes between which it is placed, in such manner as to form there a circular opening from one to two lines in diameter. To attain this object, he devised two particular instruments: 1. A species of cutting canula similar to the punch of harness makers. 2. A plate of horn or ebony curved in such manner that it could be introduced into the middle passage of the nasal fossæ, and destined to serve as a point d'appui to the punch, while we were acting with the latter from without inwards through the opening of the great angle of the eye. We thus obtain a neat perforation, which only requires to be dressed with a meche of lint to cause its borders to cicatrize and become rounded and callous. As it is almost impossible to apply the nasal plate, and as the perforation with the actual cautery is also accompanied with a loss of substance, without thereby rendering it always successful, no person, with the exception perhaps of MM. Talabère, Rougier, and Janson, who made use of it twelve to fifteen times, and who censures it, have undertaken the operation of Hunter on living man. If however it should be desired to make trial of it, we could easily accomplish it by means of the compass-punch of M. Talrich, or the trephine of M. Montain. The perforated branch of the first of these instruments having been introduced into the meatus, would serve as a point d'appui to the perforating branch, which is applied at the great angle of the eye exactly through the wound of the canal. All that is necessary after, is to press one branch against the other, in order to remove the portion of bone desired without incurring the risk of making a mistake.

6. *Process of Scarpa.*—In our day, Scarpa and others have returned to the employment of the actual cautery, in conformity to the views of St. Yves; that is to say, that after having opened the great angle, as in the simple operation of fistula, without touching, and even at the risk of wounding the direct tendon, they fill the wound with lint, leave it there in this manner during twenty-four hours, or even more, and afterwards direct upon the lower and inner part of the lachrymal sac, a metallic stem heated to a white heat, with which they penetrate into the nose. In order to protect the eye and surrounding soft parts, Scarpa no longer used the simple funnel of Verduc or Dionis, but a conical canula with very thick walls, and which supports a handle several inches long, which is united with its base at a right angle; which canula, figured by Scultetus, and rescued from oblivion by Manowry, is one which Desault also used in practice, and the first idea of which is found in Roger de Palmer or in Alcoatin-Rivard and A. Petit recommend that we should open the sac behind

like Pouteau, and not in front of the eyelid, whether we propose to penetrate into the nasal fossæ, or intend to stop at the canal.

7. *Process of Nicod.*—At a more recent period Nicod has proposed to combine together in this method perforation by means of the trochar, and cauterization by means of the hot iron. In a patient whose nasal canal was entirely wanting, Dupuytren by means of a drill, as recommended by Wathen, made another in the direction of the natural channel, then kept it open by placing a canula there permanently.

8. *Process of M. Laugier.*—Briot having noticed that M. Pécot had, in spite of himself, penetrated in one instance into the antrum highmorianum, and having himself, on another occasion, penetrated through the os unguis into the nasal passage, has furnished the proof that fistula may be cured in this manner, since the affection did not reappear in the two patients whom he mentions. This certainly is better than nothing, but I doubt if, notwithstanding the reasons, and some facts mooted in its favor by M. Laugier, who, transforming this accident into a rule, has proposed to penetrate, at the very first, into the maxillary sinus, and to leave a canula there permanently,—I doubt, I say, if such a method can ever have numerous partisans. Nothing, in fact, proves that the tears, having arrived in the sinus, could make their egress from thence with facility, that they would not produce accidents, or that it would be easy to make an exit for them by piercing the vault of the palate. The perforation of the os unguis would have still fewer inconveniences.

9. *Process of Warner.*—Warner, desirous at all hazards of obtaining a permanent opening for the passage of the tears into the nose, destroyed the os unguis extensively, whether carious or not. In union with the extirpation of the sac, eulogized by Woolhouse, and which M. Jameson has again proposed in our times, the process of Warner has been reproduced by M. Gerdy, since the principal object of this surgeon is to destroy the entire inner wall of the nasal canal.

10. *Appreciation.*—If, as I with so many others have had it in my power to testify, the treatment of lachrymal tumor and fistula by setons, the canula and caustics, will succeed in nine cases out of ten, the process of Woolhouse, already rejected as useless by Marchettis, Solingen, Maitre Jan, and especially by the Nannoni, would in our time no longer be worthy of consideration. So long as it is possible to act on the natural passages, we should, by this hypothesis, be censurable in attempting to create a new one; in the contrary case, it would be more rational to imitate the conduct of Wathen, or pierce through the track of the nasal canal, like Dupuytren, than confine ourselves to the perforation of the os unguis or sinus, as after the manner of Saint-Yves or M. Laugier. Should there be necrosis, we ought then to treat the fistula by one of the other methods, for the disease of the bone requires no other care than it does when situated in any other part of the body. The employment of the actual cautery or chemical escharotics is not without its danger, when they are carried so near the eye: they have, more than in one instance, produced obliteration of the lachrymal ducts, and by this means an incurable epiphora. What would seem to deter still more from the method of Woolhouse is this, that the tears rarely acquire the habit

of falling into the nose, even though the passage which has been opened for them should remain free, (*béante.*) "As to the mode of cure," says Guy de Chauliac, "by piercing through the nasal channels by means of an awl, it is not approved of by Hében Mesué, and I have not found it effectual, for immediately afterwards the aperture through the bone fills up, and there is nothing which can run through it or flow into the nose;" so that, besides the deformity which it makes at the great angle of the eye, the patient is left with an epiphora, (*larmoiement, weeping eye or delachrymation,*) which is, in most instances, beyond the resources of art; but in my view it is demonstrated, at the present day, that we have very often deceived ourselves on this point, and that we are more than ever justified in still attempting new trials.

F. *Closure of the Canal.*—In the midst of this labyrinth of methods or processes, there is one, perhaps, which has not been examined in a correct point of view; I mean cauterization. Everything authorizes us to believe that practitioners, like Severin, (*Méd. Effic. Exopyrie*, p. 656,) and Scultetus, (*Arsenal de Chir.*, tab. 34, p. 190, 1712,) among others, who had so much confidence in the red hot iron and escharotics, rarely cured fistula lachrymalis but by obliterating the nasal canal. This obliteration, which was proposed by L. Nannoni, was systematized into a method by Delpech, and M. Caffort of Narbonne has written to me that nine patients who were treated in this manner were all cured. A piece of nitrate of silver, as large as a bean, is deposited in the upper part of the canal, while the sac is also cauterized at the embouchure of the lachrymal ducts. The operation is repeated three or four times in the space of twelve days, after which we make use of simple dressing. A hard cord is formed in place of the lachrymal passages, and no epiphora follows! It appears also that Bosche, who cauterized the lachrymal puncta with the view of shutting them up, had no apprehension from this obliteration; and that M. Malgaigne, like Anel, Gunz, Petit, and Demours, has seen instances where the lachrymal ducts were wanting, and where there was no epiphora produced. If such were the fact, a very simple method might be substituted for all those which have been in vogue up to the present time. The excision of the puncta lachrymalia would be all that would be necessary. I have performed it in two instances, but I can as yet give no statement of the result, except that the tears, notwithstanding, penetrate into the nasal canal, and that I have not been enabled to obliterate in this manner the lachrymal ducts. Cauterization, in the manner of Delpech or M. Caffort, was not successful in the three cases in which I used it. In conclusion, I am of opinion that there remains at the bottom of this subject, a question of physiology and therapeutics which has to be examined.

G. *Anomalies.*—However distended the *sac* may be, it rarely happens that we are obliged to follow the precept of Boyer, and excise a portion of it, or to have recourse to compression, as Guérin recommends. Cauterization with the nitrate of silver, as advised by Scarpa, would evidently be preferable in the majority of cases.

Excision, however, is a practice which we should be wrong in rejecting absolutely. If it is true that we may in reality dispense with it, it

is also true that it may, in some cases, abridge the period of cure. I have, in four cases, deemed it advisable to recur to it, and have been very well satisfied with it. The tumor, which was half the size of a nut, was of long standing, and with walls very much attenuated. After having laid it open freely from above downwards, and seized one of its sides with the forceps, I removed from it, by one cut of the scissors, an ellipse of four lines in breadth. The cyst, which in these cases is reflected as it were upon the anterior surface of the direct tendon, is only in part formed by the lachrymal sac; so also may we remove a large portion of it without wounding the tendon of the orbicularis muscle. *In place of opening into the great angle of the eye, the lachrymal tumor has sometimes made its way into the nostril through the os unguis, an example of which is given by Heister.* In *internal fistulas*, it is not the re-establishment of the course of tears which is the important point, but the ulcerous affection which is to be arrested or cured. If there should exist a tumor, though the lachrymal ducts and puncta were closed, we should have no other treatment to oppose to them than that of abscesses or chronic inflammations. Compression at first, or resolvents and astringents, and then a cut of the bistoury into the cyst, and the employment of meches or detergent injections, would be all that there was to be done, unless we should incline to leave a canula remaining in the nasal canal. In certain persons the *osseous canal* is so small that we are obliged to employ force, and even a very considerable degree of force, in order to effect the entrance into it either of a canula or any foreign body whatever. The contraction which I have here reference to, is most usually met with in adult individuals who have been affected with lachrymal tumor or fistula from their infancy, and is not to be confounded with that which depends upon an exostosis, or a deviation of the bones, &c.; it is owing as I think to this, that the canal ceasing to furnish a passage to the tears, no longer grows, and undergoes a suspension in its development, which prevents it, at a later period, from being in relation with the rest of the organization; it is in fact the canal of a child in the orbit of an adult. If the explanation which I give of this fact be correct, we should be prepared to meet with still more difficulties for the insertion of the canula in persons affected with fistula lachrymalis from childhood, than in others. I have operated in five instances under this condition of things. A young man twenty-three years of age, who had been affected with a double lachrymal tumor from the age of eight years, and who died at the Hospital of La Pitié in 1834, enabled me to ascertain, by dissection, the existence of this species of contraction. Monro and M. Lenoir appear to have noticed similar facts. It is moreover quite natural, that not only fistulas from childhood, but also very old fistulas should, in general, be accompanied with a contraction of the osseous canal, if it is true that the tears then cease to flow into the nose. Since the alveoli, like other osseous cavities, shrink (*s'affaissent*) when they have been deprived of the bodies by which they were accustomed to be occupied, we may without difficulty conceive that the nasal canal would have a tendency to contract, should it remain a long time without giving egress to the tears.

In other persons I have found the *nasal canal* greatly *dilated*, and in the form of a funnel at its upper part. This result, which is owing to the protracted distension of the sac properly so called, prevents the canula from remaining in its place but with great difficulty, causes it to mount up towards the forehead, or to fall almost inevitably into the nasal passage, at the expiration of a few weeks.

[*The extirpation of the lachrymal gland for the cure of fistula lachrymalis*, was performed with partial success in 1843. (*Revue Méd. de Paris*, December, 1843,) by M. P. Bernard; the weeping moisture, however, continued. This operation had been suggested for the disease in question by MM. Nannoni and Biangini, and has also been performed in extirpating the globe of the eye for cancer, (see *Arch. Gén.*, Avril, 1844, pp. 501-503.) M. Bernard found the gland hypertrophied. T.]

### ARTICLE III.—EYELIDS.

#### § I.—*Ectropion.*

Two causes may lead to the reversion of the eyelids outwards, the protrusion (boursouflement) of the conjunctiva and the narrowing (raccourcissement) of the skin. This last condition, or *ectropion*, properly so called, is the most serious.

A. *Ectropion from exuberance of the conjunctiva.* This first case, which is generally the easiest of cure and the most rare that we meet with, presents itself under the acute stage or in the chronic form.

I. If the malady is recent, *cauterization*, which had already been recommended by G. de Salicet, by means of a particular kind of cautery, will ordinarily suffice. M. J. Cloquet has in this manner effected the cure of an ectropion of the conjunctiva, which had existed more than a year. Saint-Yves and Scarpa particularly eulogize nitrate of silver in such cases. A good many of the dry collyria would produce the same effect. Calomel and sugar, tutty, the white oxyde of bismuth finely pulverized, with an equal part of sugar candy, especially, have enabled me to effect cures that were truly surprising and exceedingly prompt, by applying them in small quantities (par pincées) morning and evening, on all the engorged parts. Cauterization with nitrate of silver, I have found to answer in many patients, while the nitrate of mercury became indispensable in two others in 1837, at the hospital of La Charité.

II. *Excision.*—When these resources have been tried in vain, we may, in a case of necessity, imitate Anel, by passing a noose of thread through the skin near the lids, and act upon it by drawing upon it above, in order to readjust the diseased lid to its normal position, and apply at the place where the thread is, as recommended by J. Fabrice and Solingen, adhesive plasters, by which we attach its other extremity upon the forehead for the lower lid, and upon the face, on the contrary, for the upper; but besides that such means would scarcely ever succeed, it is infinitely more simple, sure and prompt to excise the conjunctiva. This also is the method adopted by all the moderns, and the one which Antylus had already recom-

mended, and which Hippocrates himself advised though obscurely, when the scarifications performed by his ophthalmoxis did not succeed. While an assistant keeps the eyelid turned back, the surgeon with a good pair of dissecting forceps in his left hand, embraces a fold of the diseased membrane sufficiently large to restore the eyelashes to their normal direction, but not so much of it as to turn them inwards; excises this fold from the great angle towards the smaller angle of the eye when he operates on the right eye, and in an inverse direction for the left eye; endeavors to include in his incision the conjunctiva only, and to cut rather in proximity to the globe of the eye than to the palpebral border; and, moreover, for the performance of this excision makes use of a straight pair of scissors, or a pair curved flatwise. A very sharp bistoury or even a good lancet would also attain our object, but the scissors are the most convenient. The blood, which at first flows out abundantly, soon stops of its own accord. The operation is now terminated, and for the subsequent treatment we proceed in the same manner as if the patient was affected with an ordinary or traumatic ophthalmia.

In cicatrizing, the wound pushes back the convex border of the tarsal cartilage towards the skin, and thus by shortening the internal surface of the eyelid, replaces it in its natural relations. To perform this excision, Paul of Egina in lieu of forceps passed a thread transversely from one ocular angle to the other, in order to raise up the conjunctiva. This excision in ectropion, which is disconnected with external cicatrices, is an operation so natural, that we have reason to be surprised not to find it adopted by all the ancient authors. Though it be true that it was performed and described formerly, by a number of authors, it is nevertheless a fact that M. A. Severin is the first, who after having obtained a great many cures by it, established it as a fixed principle in surgery. The remarks of Severin (*Médec. efficace*, part 2, chap. 33,) on excision of the conjunctiva, were forgotten like those of his predecessors, when Bordenave (*Mém. de l'Acad. de Chir.*, t. XIII., p. 150,) proposed it as a new operation, and endeavored to demonstrate all its advantages. It must be evident to whoever reflects a moment on this subject, that the best mode of bringing into their proper line the internal and external coverings of an everted (renversée) eyelid, must consist in shortening that which is too long, when we cannot or ought not to elongate that which is too short. Such was the reasoning of Bordenave, and since that time the excision of the conjunctival protrusion (bourrelet) in ectropion, has been adopted as a general process in practice. Some surgeons (see Carron du Villards, *Guide Pratique*, etc., t. I., p. 342,) under the impression that they could render this process more efficacious, have suggested that it would be advisable after the excision is terminated, immediately to raise up the border of the eyelid towards the eye, and to keep it adjusted in this manner by means of strips of adhesive plaster or bandages, in order to favor the approximation of the two lips of the wound which has been established upon the conjunctiva. Others, as Dzondi (Guthrie. *Maladies de l'Œil*, 1830; Carron du Villards, t. I., p. 343,) especially, have gone so far as to propose the excision of cutaneous cicatrices,

when any exist, or to make a semilunar incision upon the root (*la racine*) of the eyelid, in order to enable the plasters or bandages to straighten with more facility the ciliary border. But it is evident that such accessories would only tend to complicate the operation, and that they will not be retained.

III. The only treatment in fact, therefore, that can be advantageous, when there exists no loss of substance, or organic alteration in the tissue of the skin itself, consists in astringents and caustics, or excision of the conjunctiva by the method of Bordenave. The only modification, perhaps, under such circumstances which might be proposed with advantage, would consist in cutting the flap (or fold) of the conjunctiva, in such manner that its anterior border might be made to approximate as near as possible to the free border of the lid, and then to unite the two lips of the wound by a few points of the simple suture. It is probable that we would by this means abridge the time of the cure, by avoiding the inequalities of an internal cicatrix.

B. *Ectropion from shortening (raccourcissement) of the skin.*—Bridles and cicatrices, which are sometimes left as the consequence of burns, wounds and ulcers of the face, frequently produce an ectropion much more difficult to destroy than the preceding. Desiccants and caustics applied upon the palpebral conjunctiva are then no longer of any use; and it would be fruitless to attempt to re-adjust the lids by means of threads or plasters. Cauterization with the red-hot iron, and excision of the relaxed surface itself, are usually insufficient. Many practitioners, even among the moderns, admit, that the disease may then be considered as incurable. It is in such cases especially, that blepharoplasty may be called into requisition. [See Vol. I., also our notes on this subject in that volume. T.]

I. *Method of Celsus.*—Up to the time of Boerhaave and Louis, an infinity of processes were practiced in order to elongate the external surface of the eyelid thus reversed. Some with Demosthenes of Marseilles, Celsus (Lib. VII., cap. 7,) and A. Paré, proposed to make upon the skin a semilunar incision, with its horns turned towards the opening of the eye; others confined themselves to a transverse incision, the lips of which they endeavored to keep apart, by filling the wound with lint or any other foreign body; others, like Paul of Egina, and Acrel, endeavored to destroy effectually all the bridles and cicatrices, either by making simple incisions upon them, excising them with the bistouri or scissors, or by strangulating them by means of a ligature. At present it is admitted, that these different operations, far from being advantageous, are almost always hurtful, and that in spite of every precaution, the wounds which result from them, shorten the integuments of the eyelid in place of favoring their elongation.

Though it be true that the ancient method of Celsus is frequently the most inefficient in cases of ectropion from alteration of the skin, it is, moreover, also true, that it may sometimes succeed. M. A. Petit (*Obs. Chir.*, p. 175, obs. 94,) gives a curious instance of it; there existed a breadth of scarcely three lines between the tarsal cartilage and the eyebrow; the conjunctiva was incised without any benefit; when the external semilunar incision, and in such manner as

to comprise only the skin, was then resorted to, and the lips of this incision kept apart by lint. The bottom of the wound by healing up (par dessication,) was transformed into a cicatrix of three lines in breadth, and the eyelid was thus enabled to cover the eye as in health. M. Malvani, (*Journ. Gén. de Méd.*, t. 108, p. 28,—or *Arch. Gén. de Méd.*, t. XXI., p. 273,) and Pellier de Quingsy, (*Obs. sur l'œil*, p. 502, obs. 201,) moreover, who relate facts borrowed from Daviel and Marchand, equally prove that this method does not deserve all the blame, which following the example of Herlse, who wrote in 1668, the moderns have generally reproached it with. It is, however, to be considered that it is exceedingly uncertain, and that it is scarcely worthy of being revived at the present day.

II. *Process of Antylus and M. Adams.*—In 1813, M. Adams, an English oculist, proposed for difficult cases a process which he supposed he had invented, but which M. Martin (*Thèse*, Paris,) attributes to Physick and M. Bouchet, and which is found in part described in Aetius, (*Serm. 3, cap. 61, 62.*) A triangular flap or V, whose base corresponds to the eyelashes, is cut out at the expense of the affected eyelid. The two sides of the division are then reunited by means of suture. The advice of M. Adams has been adopted in France by Béclard, and especially by M. Roux. I have seen it employed, and often employed it myself successfully. Antylus (Peirylhe) who made his incisions from the adherent to the free border of the lids, was careful in dividing only the conjunctiva, tarsal cartilage and orbicularis muscle; of leaving, in a word, the skin intact, which manifestly distinguishes his process from that of the English surgeon. M. Adams and M. Roux first seize the eyelid with a ligature forceps, then cut on each side through its whole thickness, and in this manner circumscribe the triangle mentioned above, by commencing at its base. The blood which immediately runs out copiously, and which comes from the ciliary or palpebral artery, soon ceases of itself. To reunite, M. Adams restricts himself to a single point of suture placed very near the eyelashes. M. Roux proceeds precisely as in hare-lip, that is to say, that with one or two short, strong pins, or those little pins called minnikin pins, (camions) he constructs the twisted suture. In place of the bistoury, it would be as I think, more convenient to employ a good pair of scissors, as I have frequently done. The operation is then more prompt and certain, and the section of the tissues neater and incomparably more easy. Also, I cannot see that there would be any use in giving more than two or three lines breadth to the base of the flap to be cut out, or to prolong its extent beyond the tarsal cartilage.

III. *Process of M. Walther.*—In a patient in whom the ectropion occupied only the temporal half of the eye, M. Walther, (*Bulletin de Féruccac*, t. XIII., p. 77,) after having extracted the eyelashes, seized with a forceps the outer extremity of the lower lid, which he divided through its entire thickness as far as the temple, then did the same for the upper lid, and removed the flap of soft parts thus circumscribed. The two lips of the wound approximated from above downwards, were kept in contact by two points of suture, and the patient recovered perfectly. This process, it is seen, is no other

than that of M. Adams, applied to the smaller angle of the eyelids, and cannot be applicable except in cases similar to that mentioned by M. Walther.

IV. *Process of M. Key.*—In 1826, M. Key had to treat an ectropion, which MM. Travers, Tyrrell and Green had vainly endeavored to cure by the ordinary methods. M. Key, supposing that the cause of the reversion of the lid in this man might have depended upon the spasmotic contraction of the orbicularis muscle, made a transverse incision in the skin, and penetrated little by little as far as to the convex side of the tarsal cartilage; directed an assistant to keep the two lips of the wound apart, and was then enabled to seize with the forceps a bridle of fleshy fibres, which he divided by means of a very sharp pair of scissors. The operation was attended with entire success. I do not know if practitioners will adopt the views of M. Key; I am not aware that they have been precisely stated; what is certain is, that we cannot well conceive of the existence of these supposed spasmotic contractions, nor how the excision of a portion of the orbicularis muscle of the eyelids can remedy ectropion; nevertheless, as in surgery especially, as soon as a fact is averred, whether it is comprehended or not, prudence recommends that it should be admitted, I have not thought it proper to pass by in silence the operation of the English surgeon.

V. *M. Brach*, (Kleinert's *Répert.*, Fevrier, 1837, p. 22,) who proposes to circumscribe and then excise a quadrilateral flap of the integuments, and to have recourse afterwards to the suture, appears to me to have intended to speak of, or to propose an improvement for the treatment of entropion, rather than that of ectropion. The same remark I think may be made of M. Jacob, (*Dublin Hospital Reports*, vol. V., p. 390,) who imagines the operation may be rendered more sure, by confining ourselves to the division of the temporal angle of the eyelids.

VI. The process of M. Dieffenbach, (*Bulletin de Féruccac*, tom. XXVI., p. 97,) consists in an incision on the base of the eyelid, with a view of penetrating in this manner to the internal surface of this organ, and to draw its conjunctiva with the convex border of the tarsal cartilage outside, in order to fix them by means of a suture in a fold of the skin. This, however, is an operation which it appears to me ought not to have the preference but in a very small number of cases, and which would expose to a deformity nearly as great as that of the ectropion itself.

VII. Should any of the processes of which I have hitherto spoken, not appear to be suitable, and should the shortening of the skin be considerable, we should have at our command the resources of blepharoplasty, such as I have described it in another part of this work. In such cases I think satisfactory results might be hoped for from the *method of Jones*, even more than from the modification proposed for blepharoplasty in general by M. Hysern of Madrid, (*De la Blepharoplastica temporo-faciale*, Madrid, 1834,) though this modification, which I had not an opportunity of speaking of at the proper time, and in favor of which the author relates two successful examples, is in other respects very ingenious. The method of Jones has the immense advantage of not substituting a deformity in place of

that which we wish to destroy, and of being easy of execution and devoid of serious dangers. I had suggested it in 1834, and I still believed myself the inventor of it in 1837, when I learnt that M. A. Bérard made a trial of it without success, and that M. Jones had employed it in two instances with advantage. M. Sanson, who, according to M. Carron du Villards, (*Maladies des Yeux*, t. I., p. 347,) had also employed it, had no reason to be satisfied with it, since his patient, who was soon seized with an erysipelas, ultimately died. Having finally put it in practice in 1838, I ascertained that it was in reality easy and more prompt than any other, and that we should be wrong in not giving it the preference in cases where all that would be required to adjust the eyelid would be to elongate the skin to the extent of some lines. The young man whom I operated upon in this manner, had had almost the entire left cheek destroyed by a carbunculous affection. The lower eyelid was thus depressed as far down as to a line with the suborbital foramen, and the inferior half of the eye thus remained entirely uncovered. Having cut and dissected the flap, I first united the apex of the wound, to the extent of six lines, by means of three points of suture. Three other points of suture outside, and as many on the inner side, afterwards approximated the sides of the flap and the borders of the solution of continuity that were still free. An erysipelas which made its appearance on the sixth day, did not prevent the agglutination of the parts from being accomplished, and the patient left the hospital at the end of a month with his eyelid raised up to the extent of four lines, though still a little reversed, and in such manner as not to touch the upper lid except under the influence of a very strong contraction of the orbicularis muscle. It would be necessary, moreover, in order to derive all the advantage possible from this operation, to prolong to a very considerable distance the incisions on the side of the base of the orbit, and to dissect the flap nearly as far as the root of the eyelashes, in order to separate its apex as much as possible from its point of departure. It would be moreover necessary to reunite the whole by numerous points of suture, and to endeavor to place in contact the borders of the wound to an extent of from four to ten lines below the point of the V, which moreover would be included by one of the threads or one of the pins. (See Blepharoplasty.) Should ectropion have been caused by any tumor whatever developed in the interior of the orbit, or in the substance of the eyelid itself, it is unnecessary to say that the surgeon should direct his attention to this tumor, and not to the reversed eyelid.

#### § II.—*Blepharoptosis.*

When the upper eyelid is kept depressed to such degree as to completely conceal the eye, and without the eyelashes being turned inwards, whether such disease should depend upon the inaction of the levator muscle, or that it is owing to any other cause, if it is ancient, and has not yielded to antiphlogistic or exciting remedies, or to local or general pharmaceutical means, we are necessarily obliged to have recourse to the resources of surgery for this malady. The process ascribed to M. Hunt, (Carron du Villards, *Oper. cit.*, t. I.,

p. 254,) and which I have described above under the name of M. Brach, might in this case be useful. Having excised his elliptical or quadrilateral flap, the surgeon would attach the palpebral border to the superciliary border of the wound, and would thus place the movement of the eyelid under the influence of the occipito-frontalis muscle; we should be wrong, however, to put too much confidence in this remedy. The operation which the fall of the upper eyelid may require, and which is the same nearly as for entropion and trichiasis, has moreover considerably varied.

### § III.—*Trichiasis.*

Hippocrates passed two nooses of thread through the skin, one near the free border, the other towards the base of the eyelid, and knotted them together in order to turn the eyelashes outwards.

A. *Excision of the integuments.*—But it is to the excision of a transverse cutaneous flap, that attention has been more especially directed. Already carefully described by Celsus and G. de Salicet, this excision is performed in various ways. Acrel, who also proposes it, recommends that we should give a rhomboidal form to the flap. As it appeared to him that it would not always be attended with success, he suggested the idea of incising the integuments above the eyebrow, and to remove therefrom a segment of very considerable size. Celsus and Galen traced out with ink the limits of the flap to be removed, and afterwards reunited the wound by means of a single point of suture. Aëtius advises that one of the incisions, the superior, should be semilunar, and that the inferior should be straight. In place of one point of suture he employed five. Paul of Egina commenced by making upon the internal surface of the eyelid, behind the eyelashes, a transverse incision, extending from one angle of the eye to the other. This was associated with excision and three points of suture. L'Habitant, (*Annuaire d'Evreux.—Jour. de Med.*, 1806, t. XII., p. 368,) cured a patient in five days.

B. *Cauterization of the Skin.*—Rhazes had already endeavored to replace excision by means of caustics. Abul-Kasem made use of the hot iron or quick-lime. Costæus especially, and D. Scachi have eulogized the actual cautery. Ware incised before cauterizing. M. Héling (*Bulletin de Féruccac*, t. II., art. 20) and M. Quadri have bestowed warm encomiums upon sulphuric acid. The professor of Naples commences by causing the eyelids to be gently separated apart and then washes, wipes and carefully dries them by means of a fine piece of linen or a sponge. He then, by means of a small bit of polished wood, applies the acid upon the skin which corresponds to the border of the tarsal cartilage, and this to the extent of four to six lines transversely; waits some seconds, in order that the first application of the acid may combine with the tissues; repeats it a second, third and even a fourth time, until the eyelid is slightly crisped outwardly, and he adopts moreover every precaution possible to prevent the caustic from penetrating to the eye.

The *excision and cauterization* of the skin, whether with sulphuric acid, or with potash, as M. Solera (*Bulletin de Féruccac*, t. II., p. 417) prescribes, evidently produce the same final result. By both

methods there is a loss of substance. In order that cicatrization may be effected, the lips of the wound are obliged to approximate towards each other. The result is always a shortening of the eyelid and especially of its outer surface. After excision, to which moreover we should give a variable extent, according to the degree of retraction that we desire to produce, should we, after the manner of the first authors who have employed it, as De Beer and M. Langenbeck, have recourse to the simple or quilled (*emplumée*) suture, or should we, as Scarpa recommends, confine ourselves to a simple dressing and union by the second intention? This is a matter of choice, and not of necessity.

C. *Tearing out* (*arrachement*) *of the Eyelashes*.—One of the most ancient methods of treating trichiasis, and especially districhiasis, is the extraction of the deviated hairs, the first idea of which, according to Galen, is to be attributed to Popius. Nothing, in fact, seems more natural, in order to destroy the pain and inflammation which then exist in the front part of the eye, than to remove their cause. Unfortunately it is soon perceived that this remedy is only a palliative, and only relieves but for the moment; and that, in growing out again, the extirpated eyelashes almost constantly retake their morbid direction. Nevertheless it is almost the only operation approved by La Vauguyon, Maitrejan, De La Motte, and even Richter, when the tarsus itself is not diseased. In order to protect ourselves from such an inconvenience, practitioners proposed to apply a caustic upon the root of the hairs which have been extracted. Sulphuric acid, butter of antimony and nitrate of silver have in turn been lauded for this purpose. If there are only two or three hairs that have deviated, then mere extraction by means of a tweezers (*épilatoire*) very frequently will be found quite sufficient. In repeating it as soon as the eyelashes reappear, we ultimately either destroy their root or change their direction. It is, moreover, an operation too simple, and which too constantly affords relief, not to be made trial of at the very beginning. I have employed it three times with complete and perfect success. Excision with the extraction of the eyelashes, as Forlenze advises, (*Annuaire d'Evreux*, 1810, p. 68,) could have no object.

D. *Cauterization of the Eyelashes*.—Perceiving that all these remedies might fail, some surgeons made trial of the actual cautery, after the advice of Rhazes. In our times, also, some practitioners have found no better method of remedying trichiasis than an improvement on the mode of cauterization employed by so many ancient authors, and especially by Celsus, who made use of a needle heated to a white heat. The form of cauteries formerly employed did not allow of carrying the caloric to a sufficient depth. That of M. Champesme (*Revue Med.*, 1826) is terminated by a point which supports a large, smooth dilated ball which approximates it a little to the cautery called sparrow-head (*tête de moineau*). Heated to a white heat this point, though very small, maintains the heat sufficiently to form rapidly eschars on every part to which it is applied. M. Champesme asserts that he has seen trichiasis several times radically cured by his instrument; and we could not deny its advantages if, as A. Paré sustains, cauterization of the lashes ought to have the decided preference. M. Carron du Villards, (*Op. cit.*, t. I., p. 307,) plunging

in an insect pin to the depth of a line and a half, in following the direction of the lash in each bulb, afterwards unites together all the pins thus implanted, by means of a silver thread, and then seizes hold of them with a curling tongs (*fer à papillottes*) strongly heated. The process of Celsus, Paré, or of M. Champsme, is by this means rendered as simple as it is easy.

E. *Reversion of the Eyelashes outwards (eversion).*—A mode less severe, and which appears to have been attended with some success, consists in reversing the deviated eyelashes upon the skin of the eyelids. Heraclides, who passes for the inventor of it, kept them there, as did also Acton, by means of plasters. I have succeeded by this mode in a case which had resisted excision of the integuments. Celsus and Galen say that in their time some persons introduced through the skin by means of a needle, a woman's hair doubled in such manner as to enable it to entangle the deviated eyelashes in its noose. According to Rhazes, we succeed full as well by crisping (*frisant*) them with a hot iron.

#### § IV.—*Entropion.*

A. *Excision of the skin,* so strongly recommended by Bordenave, Louis and Scarpa, and almost all the moderns, as a remedy for entropion, is an operation too simple and one that too frequently succeeds not to be made trial of at first. The surgeon being placed in front of the patient, seizes with an ordinary forceps or with his fingers, or with the crutch forceps (*pince en béquille*) of Beer, a fold of the integuments sufficiently large to make the lashes turn upwards and forwards. If this fold should be too large, we should incur the risk of producing an ectropion; if not sufficiently so, we should only obtain an imperfect cure. It is to be excised moreover, in the same manner and with the same precautions as the protrusion of the conjunctiva in lagophthalmia or simple ectropion. After the operation, Scarpa recommends that the skin of the face for the lower eyelid, and that of the eyebrows and forehead on the contrary for the upper eyelid, should be pushed back towards the orbit, and maintained and gathered at this point by means of graduated compresses or adhesive plasters extended from the cheek bone to the forehead. “On the following day,” he remarks, “the patient may open his eye, and if proud flesh or fungosities grow up at a subsequent period at the bottom of the wound, they are repressed by nitrate of silver. It is in such cases especially that Beer and M. Langenbeck consider that the suture ought to be employed, in order that the eye may cease as soon as possible from being fatigued by the presence of the lashes. As the skin divided is very thin and very pliant, and as nothing is more easy than to perforate it with a thread, and as there would moreover evidently be an advantage in immediate reunion without gathering the teguments together like Scarpa, on the side of the eye, I cannot see why we should refuse to make use of the simple suture, were it only for the space of twenty-four hours, as is recommended by M. Langenbeck.

B. Avenzoar speaks of practitioners who preferred compressing the flap of the *integuments between two splints*, and thus cause its morti-

fication, rather than to excise it with a cutting instrument. Bartisch has reproduced this idea under another form, by proposing to compress the skin between two plates of iron united by a hinge. Adrianson, according to Heister, invented another method. By means of an instrument almost similar to that of Bartisch, and garnished with holes, he pinched up a large flap of skin, the base of which he traversed by passing threads through the apertures of the instrument, (pince,) then excised the upper border and left it to itself as well as the threads, which required to be knotted immediately, like so many ligatures.

C. *Excision of the Palpebral border.*—In obstinate cases, Dr. Schreger removes, by means of curved scissors, a triangular flap from the border of the eyelid, including in it the deviated eyelashes, and even goes, according to M. S. Cooper, to the extent of recommending the excision of the entire reversed portion of the tarsus; but we cannot see for what reason this process, already lauded by Heister and De Hayes-Gendron, ought to have the preference over simple excision of the palpebral integuments.

D. *Process of M. Crampton.*—M. Crampton, after having perpendicularly divided the free border of the eyelid to the right and left of the point which supports the deviated hairs, reunites the two vertical wounds which he has made, by a transverse incision of the conjunctiva, then brings the portion of the cartilage thus divided into its natural position, and maintains it there by means of adhesive plaster, or a suspensory to the eyelid. M. Travers, who partially adopts the views of M. Crampton, thinks that in certain cases it would be still better to excise the little flap of the tarsus. The physicians of Bimarestan, mentioned by Rhazes, and who, after having incised the cartilage, traversed it with a thread, in order to turn it outwards; Richter, who in obstinate entropion advises that we should make a transverse incision upon the tarsus, and Paul of Egina himself, who recommends that we should incise the eyelid transversely upon its deep-seated surface, are the sources, as we perceive, from whence M. Crampton obtained the idea of his process, which has again been recently attended with success in a case of ancient entropion, as employed by M. Mackenzie, (*Gaz. Méd.*, 1838, p. 775.) At all events, however, it is a remedy only to be made trial of as an exception in cases where all other means fail.

E. *Process of Guthrie.*—M. Guthrie also incises the tarsus near the ocular angles; but in such manner as to go a little beyond their convex border, afterwards he reverses it with the finger, either towards the forehead or face, according to the eyelid affected. If in falling upon the eye, the cartilage continues to turn inwards, M. Guthrie recommends that we should moreover divide it transversely, and that we should excise a portion of it at the same time with the skin which covers its external surface. Without being important or meriting any great degree of confidence, this process, nevertheless, appears to be less objectionable than the preceding.

F. *Process of Saunders.*—The most sure mode, says Saunders, is to remove almost the entire diseased organ. A thin plate of lead or silver curved like the eyelid, being previously introduced between this curtain and the eye, the operator causes the parts to be stretched;

divides the skin and the orbicularis muscle, behind the eyelashes, a little beyond and in the direction of the tarsus, dissects the flap and terminates by the extirpation of the cartilage. The inconveniences of such a method are too evident to make it necessary for me to expose them. There would be more advantage in following the advice given by M. Jaeger, then by M. Flarer, to excise the cutaneous portion of the free border of the eyelid, respecting its ocular portion, while at the same time removing the deviated eyelashes and their roots.

G. *Process of Vacca*, (*Journ. de Progrès*, t. III., p. 273; *Bull. de Féruccac*, t. VII., p. 361.)—The conduct of Vacca appears to me to be much more reasonable. In one of the most obstinate cases of trichiasis, this surgeon proposed to lay the roots of the eyelashes bare, and to destroy them, either by means of a cutting instrument or nitric acid. A concave thin plate, having a transverse groove on its convex surface, is first placed in front of the globe of the eye. An assistant stretches the eyelid and keeps the border confined in the groove of the plate. By means of two vertical incisions of a line long united by a transverse incision, and comprising only the skin, the operator cuts out a little parallelogram, which he reverses towards the side of the palpebral opening, thus lays bare the cartilage, seeks the bulbs of the diseased eyelashes with a forceps, excises them with scissors and burns them, replaces the flap, and makes use of plasters, not the suture, to keep the wound united. The numerous branches, furnished by the palpebral artery to the eyelashes, are cut and bleed freely. Nevertheless, the hemorrhage is never troublesome, and always stops of its own accord.

Delpech, who also eulogizes cauterization of the eyelashes, not of their root, (*tête*), but of their neck, counts chiefly on the establishment of an elastic cicatrix, or an inodular tissue, and consequently prefers union by the second intention. Besides the processes already described under the head of trichiasis, viz. excision of a fold of the skin, eulogized also by Dionis, Saint-Yves, Janin and Gleize, or the red hot iron, also recently lauded by M. Jobert, entropion has been attacked by the process of Guerin, that of M. Gensoul and that of M. Segond.

H. *Guerin*, (*Journ. de Montp.*, t. II., p. 281; Carron du Villards, t. I., p. 314,) attributing the disease, without doubt, to a spasmodic contraction of the fibres of the orbicularis muscle of the eyelids, proposed to slit perpendicularly to the extent of several lines, the free, from the adherent border of the eyelid. It is said that Physick, Béclard, and M. Bouchet also had recourse to this method for entropion. We thus produce a coloboma, or a sort of hare-lip of the eyelid, which gives momentary relief, but which cannot effect a definitive cure but at the expense of a very disagreeable deformity. It is consequently a method which should be rejected.

I. The process attributed to M. *Gensoul* (Carron du Villards, t. I., p. 315, 326, *Gaz. Méd.*, 1832, p. 568,) would be less objectionable. In place of a transverse fold, this surgeon excises a vertical fold of the teguments of the eyelid. In the process of M. Segond, (*Revue Médicale*, 1836,) there is excised successively a vertical and a transverse fold of the skin, so as to unite the ancient method to the process of

the surgeon of Lyons. I do not doubt that we may succeed in this manner in curing entropion in a number of cases; but I scarcely understand the necessity of this species of crucial incision devised by M. Segond and extolled by M. Carron du Villards. An examination of a great number of cases of reversion of the eyelids also has never enabled me to comprehend the utility of the processes of Saunders, Crampton, Flarer, &c., the excision in the manner of Bordenave always having succeeded and appeared to answer with me.

J. *Process of the author.*—To render excision as simple and effectual as possible, whether by the ancient method or the method of M. Gensoul, I adopt the following process: If the palpebral border is reversed inwards, rather towards its extremities than middle portion, I prefer the excision of a vertical fold; in the contrary case I adopt excision of the transverse fold. In the first case I take care that the wound is larger at its lower part than above, and that it represents a sort of oval. In the second case I incise as near as possible to the ciliary border, and I am guarded in giving to the flap a breadth so much the greater at its middle, in proportion as the middle third of the eyelid is found more completely deviated inwards. By means of these precautions, the approximation of the borders of the wound is effected entirely at the expense of the reversion of the eyelashes, and the least loss of substance of the skin produces a decided effect upon the entropion. When, after excision of the integuments, we leave the wound to cicatrize by second intention, the cure may be long and incomplete. To confine ourselves to the employment of adhesive plaster, to approximate the sides of the wound, is very uncertain, and the blood or the tears, which flow in abundance, render the application of the suture quite difficult. These difficulties all disappear by my method, which may be adopted by any body. Having raised up, with the fingers or a good pair of forceps, the vertical or transverse fold to be excised, I immediately traverse its base with a needle, first at the middle and then at each extremity, in order to leave there three threads, each a foot long. I then excise this fold at a line in advance of the threads, and there remains nothing more for me to do than to tie them into a knot, in order to complete the suture and accurately unite the wound. In this manner we avoid all embarrassment caused by the blood; besides that it is infinitely less difficult to traverse the tissues, and that we cause less pain to the patients than if it were necessary to pass successively afterwards the threads through the two lips of the wound. This process, made trial of already in ten to twelve patients, either at the hospital of La Charité or in private practice, has appeared to me to be of such great simplicity, that I have no longer felt it necessary to make use of any other.

K. *Appreciation.*—In simple blepharoptosis excision of the integuments is almost always followed by success. It is also the most effectual remedy for ordinary entropion. If it were a paralysis of the levator muscle, we should have recourse to the process of M. Brach. In trichiasis and entropion, extirpation, extraction and reversion of the eyelashes, in the manner of Heraclides, when their length permits it, or even the process of Hippocrates, might be first made trial of. Then come, 1st. Excision of the integuments, which,

as Physick recommends, ought to be made very near the palpebral border. 2d. Cauterization of the skin by the method of Helling, M. Quadri, M. Solera, or M. Carron, which I have tried in three instances with success. 3d. Process of Vacca for the most severe cases. And, finally, 4th. The excision of the cartilage, according to the views of M. Guthrie, Schreger, M. Travers, Saunders, and M. Crampton, or even by the process of M. Adams, if no other could succeed.

### § V.—*Tumors of the Eyelids.*

If the tumor which occupies either one of the eyelids has not disorganized this curtain but only deformed it, we must destroy it without encroaching on the natural organ.

A. *Encysted tumors* come under this class; being a sort of hydatid productions or sebaceous cysts or degenerate mucipares, they scarcely ever disappear by resolution.

I. *Extirpation*.—When the vinous solution of muriate of ammonia, recommended by Morgagni as well as by Boyer do not succeed, we ought, if the patient is disposed to be relieved propose the operation properly so called. In these cases the ligature, incision, cauterization, and extirpation have been recommended. The ligature has been long since, and very properly, abandoned. Cauterization is equally rejected, unless it should be combined with incision. A needle fixed like a seton in the substance of the tumor, as recommended after a case or two by Demours, (*Arch. Gén. de Méd.*, t. XVI. p. 107,) and by M. Jacquemin, would not in my opinion succeed except by chance. So that it is to extirpation that attention has been more especially directed. In order to perform it, it is altogether useless previously to pass a thread through the tumor whether laid bare or not, as Bartisch proposes, in order to act upon it with more certainty. When it is small and appears to have its seat nearer to the conjunctiva than to the skin, we must seek for it upon the internal surface of the eyelid, because the operation then does not oblige us to go through the tarsal cartilage. The greater projection that it makes externally even ought not always to deter us, for this prominence depends much more upon the pressure of the globe of the eye than upon the precise seat of the tumor. When the skin is changed and very much attenuated, when it is attended with too much difficulty to reverse the eyelid, or when the tumor exists outside the tarsal cartilage, we are then under the necessity of dividing the integuments.

a. *First Process*.—With the thumb placed on the inner side of the tarsus and the forefinger applied upon the skin, the surgeon seizes the diseased lid; reverses it outwardly; presses upon the tumor with his finger in order to make it project in front of his thumb; lays it bare by means of a transverse incision; seizes it with an erigne, which is taken charge of by an assistant; then immediately resumes the bistoury, dissects the tumor, and isolates it in such a manner as to leave nothing of the cyst behind. The little wound which results from this operation requires no particular care, and the cicatrization is effected in the course of a few days. We might also, as soon as the tumor is secured with a hook, and when it has but little volume

and may be readily raised up, excise it with one cut of the scissors curved flatwise. Nevertheless it is important to respect the conjunctiva and subjacent tissues, and to incise rather than excise them, seeing that their destruction would expose to the danger of entropion.

*b. Second Process.*—When from necessity or choice we wish to attack the cyst through the skin, the forefinger takes the place of the thumb, and vice versa. In pushing the tumor the finger stretches the whole eyelid, protects the eye and answers a better purpose than the little cup of lead or silver formerly used, or the plate of gold or leather still recommended by Chopart and Desault. We afterwards divide the integuments cautiously, in order not to open into the morbid body. As for the rest there is nothing particular, and the cure is rarely protracted beyond from three to four days, and without the necessity of dressing.

*c.* In both cases we ought to be on our guard against perforating the eyelid, and as much as possible of wounding the tarsal cartilage, because the cure would in most cases be thereby retarded, and that there might perhaps result from it a sort of fistula or some other deformity. A good pair of forceps may advantageously be substituted for the fingers in most cases. Two forceps, one on each side confided to an assistant, gives still greater facility in stretching the eyelid while the surgeon dissects and removes the tumor. If the operator is sure of his hand, he may moreover himself fix the eyelid upon the globe of the eye by means of his thumb and left forefinger, while with the bistoury in his right hand he makes the division of the skin. Having secured the cyst with an erigene he isolates it, and afterwards separates it without danger. A plate of horn or shell glided between the eye and the eyelid, and which allows of the ciliary border being fixed on the transverse groove which exists on its anterior surface, by means of the nail of the left thumb, gives still greater security and freedom. A man from the country who had in each upper eyelid a fibrous tumor as large as a duck's egg, was cured by M. Fleury, (*Bull. de la Fac. de Méd.*, 1807, No. 2, p. 16,) who, removing an ellipse of the integuments together with the tumor, effected a cure without interfering with the movements of the eyelid.

*II. Modified Cauterization.*—Maitrejan, Heuerman, Nuck, and Loyseau, (*Observat. Chir. &c.*, p. 112, 1617,) before them commenced by largely opening the tumor in order to empty it, and afterwards to cauterize its interior. Chopart and Desault, who profess the same doctrine, use for the second stage of their operation the crayon of nitrate of silver. In adopting this method, Dupuytren gives as the reason that it is more easy, and in every respect as certain as any other, that it ensures us against the danger of perforating the eyelid, and that it is the only one that can be undertaken, when in spite of every precaution, we have penetrated into the cyst while endeavoring to lay it bare. Nothing is more easy than the manual. The organ is seized in the same manner as in the preceding case. With one stroke of the bistoury we divide the skin and small sac, which we empty, or is emptied immediately. With a crayon of nitrate of silver, directed with a certain degree of force upon the bottom of the wound, we cauterize its entire surface. The heterogeneous (coque) mass soon exfoliates, and the wound afterwards heals

up very rapidly. All other things being equal, excision is preferable; but the process of Dupuytren is almost equally as good, and will be found applicable in intractable subjects. Only it is important that the whole cavity of the cyst should be accurately and very strongly touched by the caustic; it is probably from the want of this precaution that a return of the disease took place in the three patients mentioned to me by M. Champion. I have, moreover, employed both modes with like success.

B. The *Chalazion*, the *Grelon* and *Grando*, which are so often confounded with palpebral cysts, are on the contrary small concrete tumors, occasionally fibrous, sometimes as it were caseous or tuberculous, and at other times of a fungous or mucous aspect. Under this last form they often show themselves near the conjunctiva, where I am in the habit of excising them, and afterwards cauterizing their root. It is evident that incision and cauterization would not be applicable to the others, and that extirpation is the only resource which can succeed with them. Like M. Champion, I have observed that many of these tumors have no cysts, and that in order to remove them, we are obliged to dissect them, as for example, we dissect tumors of the breast. I will remark that this small operation is quite painful, and that in certain patients it causes a manifest tendency to syncope.

C. *Erectile Tumors*.—The eyelids are subject also to other tumors. I have elsewhere given examples of the *erectile tumors* which are found here. I will add here that a tumor of this species which occupied the great angle of the eye, disappeared under the action of a compressing bandage and topical astringents, as proposed by M. Carron du Villards, (*Malad. des Yeux*, t. I., p. 353.) Caustic potash appears also to have obtained a remarkable cure of this kind (*Ibid.*, p. 355) with the same practitioner, who also asserts that the hot iron proved very efficacious in the hands of M. Jules Cloquet. It would appear that it is to his father to whom we are indebted for the treatment of erectile tumors by vaccination, and that a tumor of this kind which was situated upon the right eyebrow, was cured in this manner by himself in 1822.

D. *Cancerous Tumors*.—Experience has sufficiently proved that cauterization is an objectionable mode for destroying cancerous tubercles of the eyelids. Though even it should be a tumor of a less alarming nature, it is still with the cutting instrument that we ought to attack it, so often as the degenerescence has extended to the natural tissues. In this part, as in other regions, it is much better to do nothing than to leave a portion of the disease behind and not to trench into the sound parts.

I. When there exists only a *simple tubercle* accurately circumscribed, should it actually occupy only the border of the tarsus, we must isolate it by two incisions united in a V, remove it at the same time with the triangular flap which includes it, and have recourse to the twisted suture to unite the wound by first intention. If the alteration extends more in breadth than in depth; if after its extirpation we are of opinion that we cannot approximate the borders of the wound, we excise the tumor by a semilunar incision more or less elongated, or to a greater or less depth, either with a very sharp bis-

toury, or as M. Richerand prefers, with curved scissors, doing every-thing in our power not to wound the puncta or the lachrymal ducts. The solution of continuity cicatrizes by second intention. Gradually the integuments approximate to the eye, and ultimately form a border which replaces *in part* the eyelid which has been destroyed.

II. Cancerous degenerations show themselves, moreover, in the eyelids, as upon all other regions of the body under various forms. It does not follow, as has been supposed, because the cancerous tumor has extended as far as the conjunctiva, that its extirpation becomes impossible, or that we are prevented from having recourse to this remedy. M. Champion, who ventured to remove a large cancerous plate, and to perforate through and through the diseased eyelid, nevertheless succeeded perfectly in the case which he has communicated to me.

III. Again, the free border of the eyelid affected with *tylosis* is often transformed into a thick *bourrelet*, which in ulcerating soon assumes the aspect of cancer. But this kind of granulous and ulcerated border, which many practitioners who denominate it *noli me tangere*, prefer attacking by general medications rather than by active topical means, is in general very readily removed under the action of cauterization, by means of nitrate acid of mercury. Having reversed the diseased eyelid outwards and protected the globe of the eye by the usual means, I carefully touch all the ulcerated surface, and even the edges of the degenerated border with a piece of lint, slightly imbued with the caustic. These applications, renewed every four or five days, for three weeks or a month, transform the cancerous into a simple ulcer, and effect such a reduction in the surrounding tissues, that the wound soon cicatrizes and permits the eyelid to recover almost all its pliancy. I have, in this manner, cured a number of persons whom other practitioners had refused to treat otherwise than by extirpation of the eyelid, and it is a method which I cannot too much recommend.

IV. If the case should be one of a cancerous plate, of less thickness than breadth, and which did not extend to the free border of the eyelid, cauterization with the same acid or with the Vienna powder, or better still with the zinc paste, would be preferable to the knife; upon the condition, however, that upon the eyelids themselves, there were no other than the teguments yet altered, and that these different caustics should be applied in such manner as to not compromise the globe of the eye. I have often applied with entire success to cancerous ulcers at the inner extremity of the upper or lower eyelid, or solely and simply at the grand angle of the eye, a plate or thick piece of zinc paste, according as it appeared desirable to cauterize superficially or deeply, and I am of opinion that this caustic ought to be substituted for the bistoury whenever the cancerous ulcer, plate or tumor do not present well defined limits.

#### § VI.—*Ankyloblepharon, Symblepharon.*

A. The *adhesions* which the *eyelids* contract *with the eye* have been observed at every epoch. In order to destroy them, Heraclides, who employed the bistoury, lays down as a precept, that we

should incline the edge of the instrument rather towards the skin than towards the eye, and in order to prevent the reproduction of the adhesion should charge the patient frequently to move the organ of vision in every direction. When they are slight or but little extended, it is sometimes practicable, as Alix says, to tear them out by means of a sound or probe. If they show themselves under the aspect of bridles or lamellæ, and we can succeed in gliding under them, upon the globe of the eye, the blade of a canulated sound, we may, according to the direction of Maitrejan and Boyer, divide them upon this instrument without any danger. It is never allowable at the present day, to raise up the eyelid by means of a thread while we are dissecting it, as was the practice in the time of Bartisch. Moreover, the important point is not the division of these adhesions, but to prevent their reproduction. The movements of the eye, recommended by Heraclides, the plates of lead, gold, or leather, which Solingen and others recommend to keep between the eye and its connections, rarely attain the object in view. The porcelain or glass eye recommended by Demours, and the plate of softened ivory preferred by M. Carron, (*Oper. cit.*, t. I., p. 264,) are scarcely any better; inflammation soon renders the presence of such foreign bodies insupportable. The most prudent course is to restrict ourselves to passing, from time to time, a ring or the head of a large pin between the contiguous surfaces, in order that they may cicatrize separately. It is an operation after all, which, whatever M. A. Severin (*Med. Effic.*, part II., chap. 55, p. 215,) may say of it, ought not to be attempted, except in patients whose transparent cornea has continued unaffected and unchanged, at least opposite to the pupil. The case mentioned by this physician, who was operated upon twice by A. Petit and Dussausoy, (*Obs. Clin.*, art. 13, p. 181,) and afterwards by a charlatan, shows all the danger to be apprehended from an opposite course. Perhaps, however, we should then succeed if, after having slit up the eyelid vertically, as Guérin advises, (*Soc. Méd. de Montpellier*, t. II., p. 285,) we should keep its flaps reversed up to the period of the cicatrization of the bridles, and afterwards reunite them by suture.

B. Congenital or accidental union of the palpebral borders, always a less serious affection, may be complete or incomplete, and may exist alone or at the same time with the preceding infirmity. In the first case, in place of acting with the bistoury from before backwards, as the ancients did, upon the whole extent of the line which the natural division ought to occupy, we first make a small opening near the temple, in order to introduce afterwards, through this incision, a canulated silver sound, which is a little concave on its back, in order that it may accommodate itself to the convexity of the eye. The bistoury, guided by this director, would pass without danger from one palpebral commissure to the other in following the interline of the eyelashes. In the second case the preparatory incision is not necessary. We insert the sound through the remains of the ancient opening, as was successfully done by Hévin, (*Pathol. et Therap.*, t. II., p. 135.) In a patient operated on successfully by Quesnault, (*Lelong. Thèse*, No. 179, Paris, 1819,) there existed at the angle of the eyelids a small opening, which partially allowed of vision through

it. An opening existed also in the cases cited by Botin and Seiler, (Carron, *Oper. cit.*, t. I., p. 257.) Of the three brothers operated on in this manner by G. Lagrée, (*Anc. Journal de Méd.*, 1760, t. XII., p. 157,) one died on the eighth day from marasmus. After having separated the eyelids, if ankyloblepharon should have coexisted with the disease, we must proceed to its destruction according to the rules indicated above. In the place of the bistoury conducted upon a sound, it would be practicable to employ scissors bearing a ball of wax, as J. Fabricius recommends, or a small button at the extremity of one of its blades, according to the recommendation of Scultetus. But it would be trifling to pass a noose of brass wire furnished with knots behind the abnormal agglutination (soudure), as Duddell did, and to approximate its two halves with the view of gradually dividing the bridle.

Finally, no one at the present day would be so absurd as to imitate F. de Hilden, by knotting the two ends of this noose and attaching weights to it in order to drag it by degrees to the outside. Inasmuch as after every process the disunited borders retain, after the operation, a great tendency to become re-agglutinated, the surgeon should not neglect to place between them, near the commissures, some strands of lint imbued with cerate, nor frequently to separate them apart by means of a metallic stem or ring. To dissect the conjunctiva in order to unite it afterwards with the skin by means of a suture, as M. Ammon recommends, would often fail and presents too many difficulties. Three points of simple suture on each lip of the wound near the commissure, would better attain our object and would cause infinitely less embarrassment.

C. Simple *phymosis*, or contraction (*rétrécissement*) of the eyelids, should be treated like ankyloblepharon, and requires no other details.

### § VII.—*Tumors.—Folds at the Great Angle of the Eye.*

Two kinds of tumors, disconnected with the lachrymal passages, have been noticed in the great angle of the eye; one having the caruncula lachrymalis for their seat, the other placed between the integuments and the direct tendon. I know but one fact of this last kind, and which belongs to M. Besson. The tumor, which existed on both sides, had the size and form of an almond: it was extirpated, and the patient got well.

A. The other kind is known under the name of encanthis. It has been noticed by a great number of practitioners, and I myself recently met with an example of it in the month of December, 1837, in a young girl of six years of age. The disease may in these cases assume the character of different kinds of tumors, whether fibrous or cancerous; in general, however, it presents itself under the aspect of a small reddish granulated mass, slightly painful, and which seems to prolong itself to a greater or less distance in the orbit, and which also protrudes more or less between the eyelids near the inner commissure. Encanthis, unless it should be attacked at the beginning, yields neither to debilitating or resolvent means. The ligature, employed in one instance by Purmann, would be suitable only to pediculated encanthis. It will be by means of *caustics* or the bistoury that we shall succeed. Among the first there are scarcely any other

than the nitrate of silver or the nitrate of mercury, which can be applied with safety. Potash, the butter of antimony, and the zinc paste, would in fact expose to too much danger of injuring the lachrymal sac or the nasal extremity of the eyelids. *Extirpation* of the tumor is in itself an operation sufficiently delicate, inasmuch as it would be easy to wound either the puncta, the lachrymal ducts, the muscle of Horner, the tendon of the orbicularis muscle, or in fine the outer wall of the lachrymal sac. The patient ought to be laid on a bed of sufficient height, or seated on a chair; an assistant placed behind steadies the head and attends to keeping the eyelids separate. The surgeon, securing the tumor with an erigne, which he immediately consigns to a second assistant, isolates, by means of a straight bistoury, the morbid mass, first below, then above, then inwardly, in order finally to dissect it from behind forwards, and from within outwards, avoiding with care the globe of the eye. M. Fleury (*Bull. de la Fac. de Méd.*, 1806, p. 157, or 1807, No. 2, 3 année, p. 16,) has extirpated two of them which were of the size of a large egg, but they were situated upon the upper eyelid and not at the angle of the eye. M. Carron du Villards, (*Malad. des Yeux*, etc., t. I., p. 462,) who says that he has twice performed the operation of removing encanthis, perceiving that in one case it was a fungus and in the other a melanotic tumor, considered it necessary to touch the bottom of the wound with the button cautery in his first patient, and with caustic potash in the second. The palpebral artery, which is ordinarily divided by this operation, sometimes gives rise to a kind of hemorrhage which is quite abundant, but which simple tamponing generally arrests without any difficulty. The wound is then filled with small balls of lint, after which a fine piece of linen perforated with holes and imbued with cerate, and then a plumasseau of lint, are placed above to cover the great angle. After this nothing more is required to keep on the dressing than to envelope the whole with a compress and a few turns of bandage in the form of the monocle. After the first dressing we reduce every day the size or the number of the small balls of lint, and the wound generally cicatrizes in the space of from fifteen to twenty days. It was in this manner that M. Marchettis succeeded in detaching a meliceromatous tumor which extended over even a part of the transparent cornea, but he had recourse to the scissors to terminate his operation.

B. *Epicantthis*.—Should the fold of integuments, which from the root of the nose sometimes advances forward in the form of a crescent upon each side, as if for the purpose of covering the caruncula lachrymalis, have too great an extension, patients might readily be relieved by means of an operation which MM. Ammon and Carron, who designate this deformity under the name *epicanthis*, have frequently employed with success. Raising up the skin at the root of the nose, a vertical elliptical flap is excised, of such dimensions that the approximation of the lips of the wound by suture will immediately cause the disappearance of the two angular crescents. If before excising it we should pass pins or threads through the base of the cutaneous fold, the operation would be still more simple.

[Mr. Dalrymple, a surgeon of London, (*Cormack's Journ.*, October, 1843, p. 952,) has had occasion to remove from the upper eyelid an

encysted tumor about the size of a pea, composed of closely agglutinated epithelial scales, containing granular earthy molecules, instead of being composed as is usual of thin transparent laminæ, with a central nucleus. T.]

#### ARTICLE IV.—ORBITAR CAVITY.

*Loupes*, encephaloid masses, aneurisms, exostoses, &c., may be developed in the interior of the orbit. The lachrymal gland itself sometimes acquires a considerable volume in passing into the condition of schirrhous. These different lesions, whose especial peculiarity is to push the eye forwards, and at the same time to incline it towards the point opposite to that at which they are situated, have often given occasion for its extirpation. Nevertheless, so long as the globe is not itself implicated in the degeneration it may be saved. This is indisputably demonstrated by an elegant operation of Acrel, the case related by M. Cantoni, (*Journal des Progrès*, t. XIII., p. 256,) that of M. Gerdy, (*Archiv. Gén. de Méd.*, t. VIII., p. 339, 2e série.) and the practice of Dupuytren, (*Clin. des Hopit.*, t. III., p. 196.) An ancient memoir of Daviel and Guérin of Bordeaux proves, on the other hand, that the lachrymal gland has often been extirpated with success by those two surgeons. M. D. Lasserve (*Cas de Chirurg.*, &c., p. 52, fig. 15,) has extirpated from the orbit of a woman a cyst which strongly protruded the eye outward, and the interior of which was cribbled with hairs. Even osseous tumors may be removed without injuring the eye, either by the chisel and mallet, or by tractions or well-directed movements, as is proved by the case related by M. Sultzer. The rules to be followed for extirpation, either of the lachrymal gland or of any other tumor situated in the orbit, will have necessarily to vary according to the volume, form, nature and seat of the disease. If, for example, it was only a cyst filled with matters more or less liquid, nothing more might be required than to plunge a bistoury into it, and to keep its cavity open by means of a meche of lint. MM. Schmidt and Rutdhorffer, in fact, who have often met with cases of this kind, consider that puncture with a trochar would be sufficient. Ware (*Mal. des Yeux*, p. 188, 1805,) cured his patient of a serous cyst, which he had in the orbit, by means of sixty-three punctures. Guérin of Bordeaux, supposing that he was to extirpate the lachrymal gland or a cancer, perceived, after he had passed through the eyelid, that he had fallen upon a tumor filled with semi-liquid matters; he opened and emptied it, and introduced a tent into it, after which the cyst exfoliated on the twenty-first day. Spry, who fell into the same error in 1755, would have probably preserved the sight of his patient if, instead of going on to extirpate the eye, he had had the prudence of Guerin. The liquid humors mentioned by St. Yves, (*Mal. des Yeux*, p. 188, 1805,) Pellier, (*Obs. sur l'Œil*, &c., p. 40,) and M. Graefe, (*Archiv. Gén. de Méd.*, t. VIII., 2 série,) the collection of hydatids described by M. Lawrence, (S. Cooper, *Dict. de Chir.*, &c.,) and M. Travers, (*Synopsis*, &c., p. 229, 235, 1821,) the meliceroma, steatoma, glairy cysts, and purulent collections, indicated by St. Yves (*Oper. cit.*) and MM. Lawrence, Richerand, Guthrie, (*Mal. des Yeux*, p. 147, 148,)

and Travers, (*Oper. cit.*, p. 229,) are to be treated in the same manner.

## § II.

In respect to *solid tumors*, there are two modes of removing them. Whether they are osseous or osteo-fibrous tumors, as in the cases of Baillie, MM. A. Cooper, Crampton, (Mackenzie, p. 56,) and Travers, (*Loc. cit.*) fibrous, adipose, or cartilaginous tumors, like those mentioned by M. Mackenzie, (*Ibid.*;) or even exostoses, properly so called, examples of which are given by Sue, J. L. Petit, (*Mal. des Os*, t. II., p. 303,) and Brossaut, (Mackenzie, *Op. cit.*, p. 48, 1830,) they are notwithstanding to be extirpated.

A. *Process of Acrel.*—The whole thickness of the eyelids is to be divided in the natural direction of their curvature, near their root, and upon the point corresponding to the most prominent part of the tumor. An assistant then separates apart the lips of the wound. The surgeon, by means of a narrow bistoury, guided by the forefinger of one of his hands, isolates the tumor from the orbit, secures it with an erigne, dissects its inner surface, in order to separate it from the eye, either by the finger or the cutting instrument, and makes an effort to remove it from its apex to its base. It was in this manner that David and Guérin proceeded, and none of their patients died. Although in one of their cases the tumor had, on its inner side, a groove adapted to the optic nerve, and that in another there supervened an enormous tumefaction of the eyelids with severe fever, all preserved their faculty of vision. It might at first have been doubted if the lachrymal gland itself had actually been extracted; but Guérin dissected it after the operation, and made even a model of it in plaster; the original of which, preserved by him in alcohol, he exhibited to the Academy of Surgery. It is moreover an operation which, at the present day, is perfectly well understood. MM. Todd, Lawrence and O'Beirne have performed it in England with no less success than David, Guérin and M. Duval in France. The treatise of M. Mackenzie gives two other instances of it, and Warner, as well as M. Travers, had already had recourse to it. I have seen a woman in whom M. J. Cloquet performed this operation, so effectually that there was no longer any flow of tears on this side.

B. *Process of the Author.*—In my view, we could attain our object better than by the process of Acrel, if we were to commence by prolonging the external commissure towards the temple in such manner as to be able to reverse the eyelids. Different trials have satisfied me that by acting in this manner we may readily lay bare the two outer thirds of the orbital circumference. This being done, the surgeon separates the tumor he is about to remove from the osseous cavity which contains it, by dividing the cellular tissue from its external surface; dissects it down to its greatest depth, isolates it with every possible precaution, either from the muscles, optic nerve, or globe of the eye itself, and draws it to the outside by means of the finger or an erigne. For more facility, it would be well perhaps to circumscribe it also by a semilunar incision on the side towards the transparent cornea.

It must undoubtedly have been through inadvertence that an ob-

jection has been made to this process of incurring too great a risk of wounding the ducts of the lachrymal gland, (*Archiv. Gén. de Méd.*, t. VIII., p. 354, 2e série;) for if they required the attention, this process would enable us to respect them still better than that which consists in penetrating into the orbit through the upper eyelid.

C. *Sequelæ*.—After the operation there sometimes succeeds such an extensive swelling that it is not unusual to see the eye at the end of three or four days make as striking a projection as it did before. But this condition of things soon subsides. In the space of from ten to thirty days everything returns to its normal condition, and the cure usually takes place. Immediate reunion ought not be attempted in either process, since the cavity which is left in the orbit, cannot immediately be filled up, and that the tissues, lacerated rather than divided are obliged to suppurate. In a patient whose wound closed up too rapidly, Guérin saw supervene symptoms so formidable that he found himself obliged to break the cicatrix with a sound. All that is necessary then, is to dress with a meche or tent imbued with cerate, to approximate the wound at the palpebral angle, if it has been found necessary to divide it, and to cover the whole with plumasseaux, and then by some compresses, which are kept in place by the bandage called the monocle. When the suppuration is established the dressing should be renewed every day. Injections often become necessary, and we do all in our power to enable the solution of continuity to close up from the bottom to the exterior. If by traversing the eyelids we should render the operation more easy, even though the deformity which it involves would necessarily have to be greater, we ought to give the preference to this manner of proceeding; but unless the tumor should have acquired an enormous volume this is not the case. The incision of the outer palpebral angle will always enable us to procure a sufficient degree of separation, even though there should have been alteration of the bones, to enable us to remove the tumor as well as the necrosed splinters, as was the case in one of the patients of Guérin. In a case of M. Hope, the tumor, which had existed for seven years, had so elongated the optic nerve, that it became necessary to push back the eye with the hand, and to keep it fixed there by means of a bandage; the cure, nevertheless, was complete. In a young woman whose indocility was uncontrollable, M. Wardrop bled her to the amount of fifty ounces of blood, in order to produce syncope, which enabled him to perform the operation with so much ease and success, that the patient coming to herself, could scarcely believe it. In a case of pancreatoid sarcoma mentioned by Bouttate of Moscow, (Abernethy, *Méthode Chir. étrang.*, t. II., p. 453,) the tumor, which was seven inches in length, and three and a half in circumference, weighed two pounds and a half. It was intimately united with the conjunctiva, which it pressed upon; but it was not difficult to isolate its base from the cornea, which had preserved its transparency. After the ablation, the patient recovered his sight.

## ARTICLE V.—GLOBE OF THE EYE.

§ I.—*Foreign Bodies.*

Numerous and various kinds of foreign bodies may become fixed on the eyelids or on the front part of the eye, in the same way as between the eyelids and the eye. Besides the ordinary signs which reveal their existence, I have ascertained, like Andrieu, (*Avis au Citoyens, &c.*, p. 19, 1780,) that pungent and fixed pain corresponding to the middle of the upper eyelid, indicates the presence of a foreign body upon the cornea; in the same manner as those which are concealed in the oculo-palpebral fold of the conjunctiva, are announced by a dull pain, which corresponds to the upper border of the tarsal cartilage.

A. The *ciliary border* of the eyelids is sometimes invaded by insects. A young peasant girl who had this part of the coverings of the eye transformed into a brownish colored border, and who suffered from it to a considerable degree, carried there so great a number of pediculi pubis that M. Champion, who was then consulted, could have never believed it possible that so many of them could have attached themselves upon so narrow a space. In such cases, all that is necessary is, to cause the parts to be rubbed with mercurial ointment, that of white precipitate, or the pomade of Desault, and no operation is to be attempted. There have been seen, moreover, different sorts of worms either in the ulcerated border of an eyelid, or at the bottom of the oculo-palpebral groove. We have already an example of this kind in the Ephemerides of the Curiosa Naturæ, and we owe to M. J. Cloquet the history of a man, who had the eye and the orbit deeply excavated by a species of worm known under the name of *asticot*. I have also met with a patient, who being habitually uncleanly, and for a long time tormented by a ciliary blepharitis, had six enormous asticots at the great angle of the eye, between the inner extremity of the upper eyelid and the caruncula lachrymalis. The mode of destroying them, moreover, is the same as for the pediculus pubis, and other insects. It is also probable that camphor, so much praised by M. Raspail, (*Gaz. des Hôpits*, Novembre et Decembre, 1838,) if it were associated with mercurial topics, would give them still greater efficacy.

B. Foreign bodies of a certain size may also sometimes remain implanted for a considerable length of time in the eyelids or front part of the eye without being perceived there. A young man entered the hospital of La Charité, in 1837, with a sub-acute ophthalmia. The cornea preserved its transparency; a grayish colored chemosis with an erysipelatous tumefaction of the upper eyelid, which phenomenon was more marked in the direction of the temple than towards the nose, immediately struck my attention. The young man, who suffered but little, did not know to what to attribute his malady, which had existed for the space of fifteen days. By dint of researches, I finally discovered in the superior oculo-palpebral groove, the yellow extremity of a body which I immediately seized with a forceps, and which was nearly an inch in length and a line and

a half in diameter. It was a piece of hay-stalk, which had penetrated into the orbit while the patient was asleep upon a cart loaded with hay. Borichius (*Collect. Acad.*, partie étrangère, t. VII., p. 321) speaks of a thorn which in this manner remained for a period of thirty years in the inner angle of the eye before it occasioned any pain, and which ultimately produced a violent inflammation. A stem which was more than an inch long, and which entered the orbit through the eyelid, remained there also, says Willius, (*Collect. Acad.*, t. VI., p. 248,) a very long time without being recognized, though it produced very serious accidents, with delirium and convulsions.

C. *Fragments of whalebone* of a line or two in length have, in the same manner, become lost under the conjunctiva in a patient mentioned by St. Yves, (*Mal. des Yeux*, p. 210, art. 12.) Bidloo, Schar-schmidt and Percy (*Chirurg. d'Armée*, p. 112, 113,) give similar instances of pieces of wood, glass and pipe-stem. M. Maunoir (*Corps étrang.*, 1812, p. 212) speaks even of portions of chesnut shells which have thus become fixed on the front part of the globe of the eye; and M. Champion has noticed the same thing. There have also been seen hairs that had grown from the caruncula lachrymalis, as in the case cited by Albinus, and become incurvated outwardly so as to give momentary irritation to the eye. Demours (*Séance de l'Academie de Méd.*, 22d May, 1828) speaks of a barb of a barley ear which had introduced itself into the lachrymal punctum in such manner as to project outside, but to a very small extent. A case also has been mentioned which was noticed by Dupuytren (*Archiv. Gén. de Méd.*, t. XVII., p. 126), and in which an eyelash had, by curving backwards, become entangled in one of the lachrymal puncta. I will add that a woman who thought she had a small tumor on the sclerota, at the outer angle of the eye, and who had carried this pretended tumor for the space of nineteen months, had there nothing more than a particle of millet seed, which had come out of a birdcage, and which appeared to have been kept in its place merely by atmospheric pressure. I have seen the same thing on various other points of the globe of the eye, and even on the cornea. In all cases, the little cup reposed by its concavity on the eye, and seemed to have embedded itself into the conjunctiva. I have also found on the cornea small scales, either of cinder or copper or iron, which had retained their position in the same manner for the space of several weeks without occasioning serious accidents. A patient whom I exhibited at the clinique of La Charité, in 1837, had one of these scales in the front part of the cornea for the space of fifteen months, and had paid so little attention to it that it was for another disease that he was induced to come to the hospital.

D. A gold or silver ring, the head of a long pin, a small roll of paper, an earpicker, or any other smooth and round substance, will answer for removing the different solid foreign bodies which continue movable between the eyelids; but it is not always the same with particles of metal, stone, wood, &c., which having been projected upon the organ of vision, become fixed and retained there. In such cases, when we are not afraid of breaking them, the point of a pen, cut in the manner of a toothpick, or any other similar instrument glided upon the front part of the cornea often succeeds in detaching

them. At other times we cannot do this except with the point of a lancet, and in some cases even only by making use of a small pair of forceps skillfully managed. It is only under very rare circumstances, and when the ferruginous corpuscle is scarcely adherent, that the load-stone, as recommended by F. de Hilden, (Bonet, *Corps de Méd.*, p. 393,) (who boasts much of the successes thus obtained by his wife,) could be usefully employed. The same remark would apply to the roll of Spanish wax employed by Deshayes Gendron, or to a piece of amber to attract to the outside particles of straw. When we decide upon the operation an assistant is charged with holding the eyelids apart. The operator directs the point of a lancet or of a very sharp-pointed bistoury to the circumference of the foreign body, which he isolates down to a certain depth in the substance of the cornea, then seizes hold of it with a very fine and well adjusted forceps, draws it while moving it gently for fear of breaking it, and afterwards pursues the same treatment as in a patient having an ordinary ulceration or simple ophthalmia. This operation moreover does not in itself present any difficulty; it merely exacts address and great precision in the movements. Moreover, when the body to be extracted projects beyond the level of the eye, if it is solid and does not penetrate into the chambers, we almost always succeed in detaching it by scraping it with the border or the side of the point of a lancet or cataract needle.

E. If, as I have seen in different patients, grains of powder, or lead, or fragments of percussion-caps, glass, metal, or of a watch-spring for example, should happen to penetrate into the eye, we should, supposing that they could be perceived, not hesitate to cut into either the cornea or sclerotica in order to search for and extract them with an ocular forceps, or cause their expulsion in any manner whatever.

## § II.—*Various kinds of Vegetations.*

A. *Pterygion*.—When, by means of resolvents judiciously employed, we have not been able to disperse the pterygion, and that it advances upon the cornea to such extent as to make us apprehend the loss of the sight, it must be removed by means of the bistoury or the scissors. The section of the vessels which go to it, and which Beer still recommends, its strangulation by means of a thread passed between the conjunctiva and sclerotica, as preferred by La Vauguyon, and also cauterization, have succeeded in more than one instance; but as all these means are uncertain and more difficult of execution than excision, they have generally been abandoned. In order to remove the pterygion we seize hold of it with a good pair of forceps in one hand, at one or two lines from its point; we draw upon it a little towards ourselves as if to detach it; and soon perceive a slight crackling sound similar to that of unrolling parchment. Then it becomes easy to isolate it either from its apex to its base, or vice versa, as M. Flarer recommends, (*Thèse de Lefebvre*, Paris, 1829,) by means of the bistoury or a good pair of scissors. As the cornea rarely resumes its primitive transparency opposite the wound, Boyer recommends with reason, as I think, when the point of the pterygion has approximated very near the pupil, not to prolong the dissection as far as that, but to excise only the posterior four-fifths

of it. Emollient lotions during some days, and afterwards resolvent applications, as in all chronic phlegmasias of the conjunctiva, constitute its consecutive treatment. I have operated for pterygion by this process, in patients who had two, three, four, and even five of them on the same eye; I have never found any serious difficulty in it, and I cannot comprehend either the dangers which M. F. Cunier (*Bulletin Méd. Belge*, t. I., p. 296) charges it with, or the importance of the methods which have been proposed to be substituted for it. When the pterygion is not very thick, Scarpa is of opinion that in the greater number of cases it is sufficient to excise a semilunar flap from it opposite the point of union of the sclerotica with the cornea, and that in other cases we may destroy it entirely; that in order to prevent a cicatrix raised up in the form of a border, we should first detach the apex, then the base, and finally terminate with its middle portion. I do not, however, conceive that this last precaution can be of any great moment, and partial excision, which I have tried in three instances, has not succeeded with me. In all cases it is prudent to follow the advice of Boyer, and to apprise the patient that, notwithstanding the operation, he may not be perfectly cured, because of the species of spot which is too frequently the result of it.

**B. Pannus.**—The periphery of the cornea is sometimes covered by a grey or reddish flattened vegetation, granulated like the back of the tongue, indolent, from a quarter to a half a line in thickness, and advancing more or less, in the manner of a ring, on the transparent portion of the eye. In certain cases, however, this variety of pannus forms only the segment of a circle, while in others there appear to be detached from it semilunar or triangular plates, which prolong themselves a little farther than the rest upon the cornea. M. Graefe (*Revue Méd.*, Mars, 1818, p. 464) gives an instance of one which entirely covered both eyes. Nothing but complete excision or cauterization can remove this disease. If the pannus has but little thickness and is entirely circular, the nitrate of silver answers, and should have the preference. When it is more solid and forms somewhat large plates, excision by means of a lancet or cataract needle held flatwise, (*portée en déolant,*) followed immediately after by cauterization, is more appropriate. A vegetation of the same kind may be developed upon the cornea and remain completely independent of the conjunctiva. I saw a remarkable example of this kind in a forgeman, forty-five years of age. The plate, which was half a line thick, more than three lines long, and a line and a half in breadth, placed transversely and slightly concave above, was situated below the pupil, and left a very perceptible and perfectly sound strip of cornea between its lower border and the sclerotica. I destroyed it three times with the nitrate of silver, and three times the patient, who was very anxious to resume his occupations, left the hospital before being absolutely cured, and at the moment when there was the best reason to hope for a perfect cure.

**C. Horny Plates.**—M. Mirault speaks of a production which is much more singular still. The cornea of a man affected with trichiasis from his infancy, was covered with a kind of dirty white dry, and as it were, scaly skin. It was probably a xerophthalmia. Similar productions, or such as

were *horny*, have also been encountered on the front part of the eye in certain individuals affected with ichthyosis.

D. The cornea is also liable to other excrescences. Guerin makes mention of a young person of Macon, who had a *fleshy tubercle* as large as a pea on the front part of the pupil, and which he cured by one cut of the scissors. Some of them may be compared to *nævus*. M. Wardrop gives examples of them. In one case, the tumor was granulated, of a brownish color, and but little vascular. It was softer, of a reddish color, and placed half on the cornea and half on the sclerotica, in another patient. In a third case, three *long hairs* proceeded from it, and protruded like a pencil from between the eyelids. The same author quotes a case similar to this last, in the Baron of Gloucester, and remarks that Gazelli had also seen hairs growing from the cornea.

E. Among these tumors, there are some of them that are analogous to vegetations from the mucous membranes. These are a sort of fungus. M. Wardrop has seen two examples; one irregular, granulated, and partially on the sclerotica; the other darker and more solid. In a case cited by Voigtel, a cartilaginous point was found in the centre. Sometimes also the tumor derives its origin from an ancient ulcer. Maitrejan gives an example of this; but it appears that in his patient, the fungus came rather from the interior of the eye, than from the cornea properly so called. These different projections can only be cured by excising them completely; also, we must take care to cauterize the bottom of the wound immediately, if we expect to prevent all return; it is in this manner that Pellier succeeded in a patient who had a tumor of this kind caused by a burn from gunpowder.

### § III.—*Cataract.*

Although Galen and the Arabs had already pointed out the nature of cataract, centuries passed away before it was generally understood. The pellicle which constitutes the disease is situated, according to Culsus, between the uvea and the crystalline; on the contrary, according to Guy de Chauliac and G. de Salicet, between the iris and the transparent cornea. What contributed most to give prevalence to such errors, was the idea that the crystalline was the seat of vision. Therefore, as soon as Kepler had demonstrated in 1604, that the lens of the eye was no other than a refracting body, an actual surgical revolution was promptly brought about on this subject. Gas-sendi, who wrote in 1660, as well as Palfin and Marriotte, attribute to R. Lasnier or F. Quaré, the honor of having first sustained the idea that cataract does not depend upon an accidental pellicle, but on an opacity of the crystalline. Schelhamer, who imparted it to Rolfink, had taken the idea from a surgeon of the Hotel Dieu. Brisseau, Méry, P. du Petit, Borel, Tozzi, Geoffroy, Albinus, Bonnet, and Freytag, had also without doubt derived it from the same source. But it is to Maitrejan to whom we are indebted for having placed the fact beyond all dispute. In going from one error they were upon the point of falling into another; in place of never seeing cataract in the crystalline, it was now maintained that it was always there.

Ph. de la Hire, Freytag, and Morgagni, did not succeed without difficulty in establishing the fact, that this malady may also be produced by the opacity of the capsular membrane. It was S. Muralt, Didier, Heister, and Chapuzeau, for whom it was reserved to demonstrate, without rejoinder, that cataract is produced by opacity of the crystalline, that of its capsule, or of the matter in which it floats, and not always that of one part only.

A. *Cure without an operation.*—Though since the time of Celsus, who was the first that has spoken lucidly on this subject, it has been acknowledged that confirmed cataract is rarely cured except by the operation, properly so called, we should nevertheless be wrong in denying absolutely, the efficacy of any other treatment.

The cataract which is seen in scrofulous, scorbutic and syphilitic subjects, or in consequence of an inflammation or any other disease in the neighborhood of the eye, has disappeared in more than one instance, either spontaneously with the constitutional disease, or under the influence of general or local treatment judiciously directed. Maitrejan, Callisen, Alberti, Gendron, Murray, Richter, Ware, and many others, have given examples of this kind. Hyoscyamus applied to the eye according to M. Nostier, or a simple seton to the nape in the opinion of M. Champesme, (*Arch. Gén. de Méd.*, t. I., p. 290,) have succeeded in curing cataracts of very long standing. M. Diétrich recommends that we should arrest its development by repeated punctures to the eye, and M. Schwartz (*Revue Méd.*, 1828, t. III., p. 126) has cured three cases by means of revulsives, &c. With MM. Rennes, (*Archiv. Gén. de Méd.*, t. XXII., p. 206), P. Delmas and Manoury (*Biblioth. Méd.*, 1827, t. IV., p. 185), I have seen it disappear spontaneously. M. Janson (*Hôtel Dieu de Lyons, Compte Rendu*, 1824, p. 83) also gives two examples of this kind. MM. Larrey and Gondret affirm, moreover, that they have obtained similar results by means of moxas, the actual cautery, or the ammoniacal pomade applied upon different points of the head, especially to the sinciput. Without admitting as certain with M. de Blainville (*Nouv. Bull. de Sc. Méd.*, Fevrier, 1835, p. 31,) that the crystalline may be formed by its capsule; without conceding also with M. Campaignac, that cataract is only a symptom of disease of the envelope of the crystalline, it must at least be admitted that the cataract which results quite frequently from wounds of the eye, is to be ascribed as M. Watson (*Arch. Gén. de Méd.*, t. XII., p. 610) asserts to inflammation of the neighboring lamellæ. The repeated experiments of M. Neuner (*Journ. de Prog.*, t. VIII., p. 117; *Bull. de Féruccac*, t. XIV., p. 194) have since shown with what facility opacity of the crystalline may be produced, by means of certain liquids introduced into the eye. The experiments and observations still more varied of M. Dietrich, (*Bull. de Fér.*, t. VI., p. 84; *Arch. Gén. de Méd.*, t. XII., p. 295,) Tartra, Beer, and Szen, though contradicted by those of M. Watson, exhibit the decided influence of wounds and certain acids in the formation of some cataracts. A cataract from infancy was cured by the evacuation of a brown matter, by means of a small puncture into the capsule. The crystalline, which was sound, remained, it is said, (*Gaz. Salut.*, No. 5, 1783, p. IV) in its place in both eyes, and the sight was re-established!! From hence, without

doubt, came the new method of M. Jungken, (*Arch. Gén. de Méd.*, 2e série, t. X., p. 93.) It is doubtless difficult to believe that the crystalline, which is an inert body and the actual product of an exudation, and which receives neither vessels nor nerves, can recover its transparency after having actually lost it; but pus and other products which may be deposited in front of it, as in the three examples related by M. Boudant, (*Arch. Gén. de Méd.*, t. XXIII., p. 429,) being in more direct relation with the iris or ciliary circle, would be more or less influenced by the particular state of the eye and the general constitution of the individual. It is also well established at the present time, that traumatic cataract very frequently gets well without an operation. The case of cataract caused by a blow on the eye from the branch of a tree, as mentioned by M. Mondiére, (*Arch. Gén.*, third series, t. II., p. 352,) ultimately disappeared spontaneously. I saw a similar case at the Hospital of La Charité in 1836.

A young peasant, of fifteen years of age, was struck upon the eye by the free extremity of a small green twig of a tree. A cataract was thereby immediately produced, which was perfect when first brought under my notice, at the expiration of fifteen days. In order to reduce the inflammation which existed in the eye, and also to facilitate the cure of the cataract, I had recourse to bleeding at the arm, a few leeches to the temple, frictions around the orbit with the mercurial pomade combined with belladonna, and afterwards to a large temporary blister over the cutaneous surface of the eyelids. After having become broken up into many fragments, which successively passed into the anterior chamber, the crystalline ultimately became completely dissolved, so much so, that the boy, after having been in the hospital two months, left there almost perfectly cured, and with a pupil which presented only one single small opaque point. I saw a similar result in 1837, in a young lady who wounded her eye with a pair of scissors. Another example occurred at La Charité in 1838. Some of the observations also related by M. Convers, (*Gaz. Méd.*, 1838, p. 513,) fully corroborate this fact. In a child of five years of age, mentioned by M. Gerson, (*Arch. Gén. de Méd.*, 2d series, t. VIII., p. 224,) the cornea having been wounded by the point of a knife, a cataract was thereby produced, which got well spontaneously. Nevertheless, if on changing its color, the crystalline evidently undergoes a molecular action subject to the laws of chemistry, and if spontaneous cataract is not the product of either an electric action, or of that species of oxydation suggested by MM. Richerand and Leroy, it would be still more difficult to refer it constantly, with M. Campaignac, to alterations in the secretion of its capsule. Such being supposed to be the case, we cannot see why, by a contrary combination, it might not sometimes be possible for it to return to its primitive condition. M. Luzzato (*Encyclogr. des Sc. Méd.*, 1836, p. 405,) speaks of a patient who, after having been a long time afflicted with cataract, was cured of it by a violent ophthalmia. On the other hand, the crystalline capsule may be torn and place the lens which it contains in contact with the humors of the eye, which in their turn effect its solution or favor its absorption, facts of which description we have on record. The crystalline having passed into the anterior chamber, in a patient of Ansiaux, (*Clin. Chir.*, 2d edit., p. 161,) ultimately

became dissolved there. This body disappeared in the same manner in the case cited by M. Bobillier, (*Rec. de Mem. de Méd. Chir. et Pharm. Milit.*, t. XVI., p. 240, 1825,) and I have seen the same thing occur in three instances.

B. *Surgical Treatment.*—Surgeons, moreover, have attempted, from the remotest antiquity, to destroy cataract by means of particular instruments. Celsus in fact leaves it to be inferred, that among the physicians of Alexandria there were many, especially a certain Phyloxenes, who had acquired in this respect a very great degree of skill.

*Conditions.*—I. If the *cataract* be *simple*, if it has its seat in the crystalline or has not contracted any unnatural adhesion with the surrounding parts, if the iris retains its power of contracting and dilating alternately, if the patient still distinguishes light from darkness; if no inflammation exists either in the eye or in the periphery of the orbit; if there be present neither cephalalgia, nor a catarrhal affection, nor any general disturbance; if the eyes are neither too projecting or too much sunken in their socket; if the patient is not too much advanced in age, and if he is sufficiently tractable to submit to all the necessary treatment, the chances of success are as numerous as could be desired. When, on the contrary, the patient is enfeebled by age, that spots exist upon the cornea, that the pupil remains immovable, that a greenish tint is observed at the bottom of the eye, that deep-seated pains are felt or continue to exist in the orbit, that a chronic ophthalmia or any other malady tedious and difficult to cure, and more or less serious in its character, exists in the neighborhood of the eye, we cannot count on success. In other words, so often as the crystalline and its capsule alone are diseased, that apart from the cataract the organ is in a natural state, and that there is nothing in the orbit that prevents the reëstablishment of vision, then, whether the cataract be true or false, formed by plastic exudation, (Simmeon, *Bull. de Fér.*, t. X.) or by a return of the crystalline to its embryo condition, (Grandclaude, *Journ. Comp. des Sc. Méd.*, t. XXXI.) whether the cataract be lenticular, capsular, or capsulo-lenticular, anterior membranous or posterior membranous, hard or soft, milky or gypseous, barred, oscillating, stellated, pearly, with three branches or central, purulent, putrid, spotted or trellis-like, marbled, dry or husky, sanguineous, dendritical, yellow, grey or black, the operation should be recommended. In other cases, and especially if it is complicated with infiltration of pus (Dujardin, *Thèse, Paris*, 1830) or blood into the little receptacles of the vitreous humor, it should not be undertaken but as a dernier resource, when every thing had failed, and not until after having forewarned the patient of the slight chances that exist of a cure. Nevertheless we must not allow ourselves to be deterred by appearances.

The *immobility of the pupil* is not a certain sign of amaurosis. Wenzel, Richter, MM. Larrey, Watson, S. Cooper, &c., have shown, as I have often myself seen, that adhesions of the iris or contractions of its opening after an iritis may also produce it, and also that it will dilate and contract itself though the retina be paralyzed. I have many times seen dilatation with immobility of the pupil, in patients affected with cataract without complication of amaurosis.

Others have remained with a movable, narrow and very regularly formed pupil, without recovering their vision. Some patients who could not in any manner distinguish day from night have, after having been operated on, been more fortunate.

II. *Black cataract*, (cataracte noire,) which had already been noticed by Guy de Chauliac, Morgagni, Rolfinck and Freytag, and of which Maitrejan, Janin, Pellier, Arrachard, Wenzel, A. Petit, Edwards, Coze, (Dujardin, *Thèse, Paris, 1830,*) and MM. J. Cloquet, Riobé, Luzardi and Sanson, (*Journ. Univ. des Sciences Méd., Juillet, 1819,*) have related examples, is too rare to arrest the attention of an intelligent operator, even in supposing, which is not demonstrated, that it may exist without changing of the color of the pupil. A young girl twenty-six years of age, blind in the usual way that patients affected with cataracts are, had nevertheless the pupils *almost* perfect. The crystalline was first extracted from one of the eyes and then from the other, and the operation, which was performed by M. Roux, (*Dict. de Méd. et de Chir. Prat., t. II., p. 108,*) was perfectly successful. M. Carron du Villards, (Pasquet, *Lancette Franc., t. XII., p. 524,*) and M. Robert (Carron du Villards, t. II., p. 271,) have observed similar examples: I also have noticed two cases. Moreover, when no organic lesion nor any serious symptoms render the operation formidable, I do not see why, when the patient is completely blind, we should refuse to undertake it. In such cases the patient can lose nothing, while on the other hand, should there be only one chance in a thousand, it would be uncharitable not to let him have the benefit of it. We must nevertheless absolutely desist from it as soon as there is a certainty of a deep-seated alteration in the eye.

III. *Tremulus Iridis*.—Should the crystalline or the humors be movable, or offer the slightest appearance of tremulus iridis, we should at least be careful not to operate by extraction. The case of a crystalline thickened, and spontaneously depressed, as mentioned by Turquet de Mayerne, was it not in fact complicated with tremulus iridis? (*Prat. de Méd., p. 90.*) In a man who was in this condition, and to whose solicitation I finally yielded, the crystalline gently issued out of itself enveloped with its capsule a few moments after opening into the cornea, and the vitreous humor was in so limpid a condition that it would have escaped like water, if I had not immediately made pressure on the fore part of the eyes by means of lint. Cerebral accidents supervened and were sufficiently serious during some days, to give me the greatest degree of uneasiness. The left eye supplicated, and the right, although perfectly clear, remained altogether insensible to light. This is a state of things which I have often since met with, and which is imputable to a liquefaction of the vitreous humor. Depression alone may be attempted in such cases, if it is thought prudent to attack the cataract; the operation then produces scarcely any reaction in the eye. It has at least the advantage of causing the disappearance of a deformity by again giving to the pupil all its regularity, and this result is not to be disdained when there is only one of the eyes in a state of cataract. The mobility of the crystalline is sometimes hereditary. Portal (*Malad. Heredit., p. 87, 3rd edit.*) gives an instance of two brothers who were thus affected, and whose father had the same peculiarity.

The crystalline rested in part in the anterior chamber, as in the two patients noted by me.

IV. *Anomalies*.—*False cataracts*, which are almost always complicated with affections of the iris, or some other membrane of the eye, are not generally so easy to destroy as the true cataracts. All other things being equal, the crystalline cataract is of a less serious character than the capsular, or that of the humor of Morgagni. I have seen patients *completely blind*, though their *crystalline* was only *slightly opaque*. In others, the *cataract* appeared so *advanced* that nothing more was required for its maturity, and nevertheless *they could still see very well*. A dealer in grain in the environs of Paris furnished me a very fine example of this species in 1838, at La Charité. Arrived at the Hospital from his own residence without a guide, he could count his fingers and distinguish faces, though to appearance his two cataracts were as complete as possible. I have had occasion to remark, that persons who could see in spite of their cataract, had an opacity of the crystalline only, or of the posterior capsule, and that in them there existed a certain free space between the iris and the lenticular apparatus.

V. *A light* which is made to pass in front of the eye of a patient who does not see, will, provided there be no opacity in front of the vitreous humor, produce *three images*, one anterior, regular, (*nette*,) and straight, one deep-seated, large, diffused, and also straight, and a third in the middle small, pale, and reversed. The anterior image alone will remain in the case of complete cataract. But it is the deep-seated image only which is effaced when the opacity is concentrated upon the posterior layers of the crystalline or its membrane. This method, which I have often tried, and the use of which has been sanctioned by M. Janson, (*Pasquet, Thèse, Paris, 1837*,) has however appeared to me to afford very little reliance. It is useless in ordinary cases, and I do not think it would be sufficient in doubtful cases.

VI. *Ages*.—In children, the operation, though difficult to be performed, succeeds better than in adult age, and so much the better after that, as the patient approaches nearer to the middle period of life. The table arranged by M. Drache (*Thèse, No. 180, Paris, 1837*,) shows what are the influences of age and other personal conditions on the formation of cataract. Almost all authors agree with Sabatier, that we ought not to recur to the operation except in persons who are old enough to know the benefit of it; that it ought not for example to be employed before the tenth or fifteenth year.

a. The intractability of *children*, the little anxiety they have about obtaining their sight, and the dangers we should have to incur in endeavoring to operate upon them in spite of their wishes, and the difficulty of subjecting them to the necessary precautions, are the principal motives upon which this precept is established. But if in the tender age the operation is more delicate and more hazardous, and the membranes of the eye from being more tender, thinner, and less dense, are more easily penetrated; the eye is less movable, the pupil more large, and such patients, dreading only the pain, are in nowise concerned about the consequences of the operation. As this operation is rarely accompanied with severe pain, I cannot see how in such

cases it can have any thing in it of a very formidable character. It is, moreover, always practicable to confine even the youngest subjects, and to keep their eyelids separated apart. The eye is an organ essential to the development of intelligence, and the source of the greatest number of our ideas. If its functions should be found abolished at birth, its development ordinarily remains incomplete ; it acquires gradually an excessive degree of mobility, which renders the operation much more delicate, and diminishes the chances of success.

In conclusion, when we reflect upon the importance of the education of children, it would be really difficult not to admit with Ware, Lucas, Saunders, Travers, Beer, &c., the advantage of relieving them as speedily as possible of cataract. Nevertheless, I am not of opinion that we ought, in such cases, to select the age of two years, as Farre recommends, or the period of six weeks, with M. Lawrence, rather than the first or third year.

b. In *old men*, the disease being almost a natural consequence of old age, the operation is inadmissible, except they earnestly desire it, and are moreover found in the best conditions possible. I have performed it, however, in a man of eighty years of age, and in a woman of eighty-five, with a successful result, which is far from being always obtained in young subjects.

VII. The five hundred cases of cataract which I have noted up to the present time have not enabled me to assert that males are more frequently affected with it than females. We see by the researches made by M. Maunoir, (*Thèse*, No. 345, Paris, 1833, p. 13,) that out of one hundred and twenty-one cases of cataract observed at La Charité there were sixty-one men and sixty women ; while at the Hotel Dieu, out of two hundred and seven patients, there were only seventy-two women, while there were one hundred and thirty-five men. Before the age of thirty years, acquired as well as congenital cataract is almost always soft or capsular. After sixty, it is almost constantly solid and lenticular. The period from forty to sixty years is that which is most liable to it. Between fifteen and forty years, we must be on our guard, for it often indicates a more profound disease of the eye. Although out of seventy-two cataracts examined under this point of view by M. Maunoir, (*Lancette Franc.*, t. I., p. 392,) thirty-five only had commenced in the right eye ; this eye, according to my observation, is more frequently affected the first than the left. I have met with five patients who, from different causes, had been suddenly seized with it, like the peasant mentioned by M. Wendelstrum, (*Thèse citée*, p. 29.) In twenty cases out of two hundred it has appeared to me to be hereditary. A man whose two elder brothers, a sister, his grandfather, and great grandfather had had the same misfortune, was seized with cataract at the age of forty-two years. M. Maunoir (*Thèse citée*, p. 21) states that out of thirty-nine cases of cataract he found ten that were hereditary. In the same family at Argentan, (Duval, *Thèse*, Paris, 1830,) four of the daughters and the father and mother were attacked with this disease. But all this should not prevent us from recurring to the operation.

VIII. *Single or double.*—When the cataract occupies one eye only, there are physicians who proscribe the operation. With one eye, say they, we can see sufficiently well to get along, distinguish objects,

read, and, in fine, fulfil all the duties required of us by our social wants. The operation may produce an acute inflammation, render the sound eye itself diseased, as M. J. Cloquet has seen, and produce a complete blindness. Even upon the supposition that it does succeed, the focus of luminous rays being no longer the same in both eyes, there necessarily results from it a discordance, followed with confusion of vision, &c. To this reasoning it may be objected that if the sound eye is sometimes destroyed after the operation, this accident rarely happens; that we see undisputedly better with two eyes than with one only, and that the presence of one cataract appears to be good grounds for supposing that another may supervene upon the opposite side. As to the difference which it is supposed will take place in the field of vision after the displacement or extraction of the crystalline, experience has now demonstrated that it is not the fact. Mâitrejan, St. Yves, Wenzel, &c., relate cases in which no mention is made of it, although the patients had been operated on in one eye only. I have published some facts of this kind, collected at the Hospital of Perfectionnement. M. Luzardi writes me that he possesses a great number of similar instances, and I could myself, at the present day, add near fifty cases to those which I announced in 1826. Nor, finally, has M. Roux, who has very often extracted the cataract, found, though it existed on one side only, that it was necessary for the patients afterwards to wear glasses of different forms for the two eyes. Therefore, if the patient is young and of good constitution, if he desires or earnestly requests to be cured, we ought to subject him to the operation, even though one of his eyes may be wholly sound.

IX. *Maturity of the Cataract.*—Formerly it was supposed that cataract passed through different degrees of consistence; that soft and diffluent in the beginning, it becomes gradually firm and solid; in a word, that it may be *ripe* or *not ripe*. At the present day science is under the empire of more correct opinions. It is now known that cataract may be very solid at the commencement, and become almost liquid after a long lapse of years. It is nevertheless true, that the contrary is very frequently observed, and that the idea of maturity and immaturity is not altogether destitute of foundation. Cataract being almost constantly the result of a morbid action from some internal cause, is not in reality perfected until at the moment when this cause ceases to act on the eye, and when the opaque body is no other than a *necrosed* portion of the organism, and an actual foreign body. It is not, therefore, because it is too soft or too hard, that we ought to wait for its complete development; but because its progress not being limited, there are then evidently less chances of success than at a more advanced epoch, and when its separation (coction) has been perfectly effected.

X. *The two Eyes.*—Scarpa, Dupuytren, and many other skillful surgeons have maintained that it is better when the cataract exists in both eyes, to perform the operation first on one side, and not to have recourse to the other until after the cure of the first. If it succeeds, the patient may rest satisfied with it, so long as the eye is not too much enfeebled. If it fails in its results, there still remains at least one more resource. The patient bears the second operation with more courage and less alarm than the first. When we operate on

both eyes at the same time, the inflammation may be communicated from one to the other, the reaction must be more acute and the danger of accidents supervening greater than when we operate on one eye only. Boyer and Dupuytren have remarked on this subject, that double ophthalmia when once developed, rarely fails of arresting itself definitively on one eye only, which takes upon itself, so to speak, the onus of the disease of both, and in most cases ultimately becomes destroyed. The whole of this is questionable; and as the simple operation, even in the most fortunate cases, only imperfectly reestablishes the sight; as patients much rather prefer to sustain the two operations consecutively, than after a certain interval of time; as the operation on one side sometimes causes inflammation of the sound as well as diseased eye; and as the double operation presents numerous favorable chances for one of the two eyes at least, if not for both, I conclude, with Wenzel, Demours, Forlenzi, Boyer, &c., that all other things besides being equal, it is better to adopt this last course.

XI. The *preparations* that the ancients caused their patients to submit to, are almost wholly laid aside by the moderns. At the present day, we limit ourselves to the employment of a regimen more or less rigid during the space of several days; bleeding, some laxatives or a gentle purgative; diluent drinks or antispasmodic and anodyne preparations, according as the patient exhibits certain indications of plethora, obstruction in the alimentary passages, or too great a degree of nervous irritability. As a preventive means of inflammation, there are some who apply a blister. Scarpa places it upon the nape fifteen days beforehand, and M. Roux only the evening before. Forlenzi prefers placing it upon the arm. I am not certain that this application is not more dangerous than useful. Many practitioners dispense with its use, and do not appear to have had cause to regret it. If adopted as a general precept, it must frequently do harm. During the first days, it sometimes produces a heat in the skin, and an irritation which may react in an unfavorable manner upon the eyes. If we confine ourselves to placing it upon the neck, it would then be better to follow the rule of Scarpa, or of Dupuytren, who, when he thought proper to make use of it, left it on fifteen days before proceeding to the operation. On the arm it is evident that the patients can receive no disadvantage from it; nor can we perceive that it can have the least degree of efficacy. For myself, I use it only after the operation, upon the supposition that special accidents require its employment, and I have not found that there were any objections to be made against this mode of proceeding.

XII. *Seasons.*—Spring and autumn, which are more favorable than winter or summer for the success of all operations, have been selected also for those of cataract. We cannot undoubtedly refuse to those two seasons some advantage to the patients, in consequence of the temperature, which is usually more mild and uniform than at other periods of the year; nevertheless, as these conditions may be obtained or found at any time, cataract may in fact be operated upon at any season. We ought not, however, to decide upon it without caution, if an epidemic of a somewhat grave character should be prevalent, especially those which more particularly affect the mucous membranes. When there are prevailing catarrhal affections, doth-

enteric fevers, ophthalmias, measles, or even erysipelas, prudence requires that we should refrain from it.

C. *Operation for Cataract by Depression.*—In some cases we confine ourselves to displacing the crystalline, or placing it under such circumstances, that it may disappear under the influence of the action of the organism; in other cases, on the contrary, we expel the cataract from the eye, in endeavoring to remove the opaque body in its totality, which constitutes two general methods, that of depression and that of extraction. The first, still known under the title of the method by *depression*, comprises, moreover, the method by reclinazione (*réclinaison*), or *reversion*, or that by discision (*discision*), or breaking up (*broiement*), and is performed in different ways; it takes the name of *scleroticonyxis* for example, when in order to reach the crystalline the needle is directed upon the sclerotica, between the uvea and the vitreous humor, or when we purposely penetrate through the hyaloid substance; and it is called *kératonyxis* when we reach the eye in its anterior chamber, through the transparent cornea.

I. *Preceding steps.*—The evening before the operation, the patient, who should have taken only light soups, ought to have administered to him an injection, if his bowels are not already free. An aqueous solution of the extract of *belladonna* applied between the eyelids an hour or two beforehand, forces the pupil to dilate itself largely, enables us to follow with the greatest degree of certainty all the movements of the needle, to avoid the iris with greater facility, and more readily to compel certain portions of the cataract to pass into the anterior chamber, should that be judged necessary. The irritation which such an application produces, is too trivial to be worthy of consideration. The momentary mydriasis which results from it soon disappears, and alters in no respect the functions of the organ. The advantages which it gives are in reality of the highest degree of importance, and should not be sacrificed to idle fears. In irritable and timid persons, in whom the eye is very movable, it is well in order to accustom this organ to the contact of foreign bodies, to touch it several times during the space of some days, with the blunt extremity of any instrument whatever, or even with the finger.

a. The *articles* comprise two needles at least, in order that if one should fail, we may continue the operation with the other; a cap or serre-tête, which should accurately embrace the cranium; a long compress to cover the sound eye while we are operating on the other; small oval pieces of fine linen, perforated with holes, and which are to be placed in front of the orbit after the operation, in order to prevent the lint from coming directly in contact with the lids; a bandage of linen folded double, sufficiently long to go round the head, four to five fingers' breadth in width, and presenting at its middle portion, near its free border, the division of a J reversed, to lodge the nose; finally, a band of black taffeta designed for covering the preceding; lastly, a fine sponge, hot water and pins.

b. *Needles.*—As it is more especially for extraction that the *speculum*, elevators and *ophthalmostats* have been proposed, I shall say nothing of them in this place.

As to the needle, we have an infinite variety of them. The one

that Celsus recommends was spear-shaped, straight, and two inches long ; at a subsequent period, it was found more convenient to make use of those that are round ; since then the triangular needle has been revived. At the present time, every oculist, so to speak, has his own. That which Scarpa succeeded in rendering popular, slender, and only eighteen lines long, is terminated by a point slightly widened, curved into the shape of an arc, flat on its convexity, and cut into a ridge on its concavity, and like all the others, mounted upon a handle of flat sides and bearing a mark of a different color on its back. *Dupuytren* rejects the kind of crest which is found on the concave surface of the needle of Scarpa ; his, on the contrary, is somewhat more flat on this side than on the back, in order more accurately to embrace the crystalline, and to expose it less to be divided when we endeavor to depress this into the bottom of the eye. He also recommends that it should have less breadth, and that its body, slightly conical, should completely fill up the track traced by the point, in order that the humors cannot in any degree flow out during the operation. The point of that which is adopted by *M. Bretonneau*, is shorter and also as broad as in the needle of Scarpa. Its body, which is of melted steel, finer and almost cylindrical, passes freely and without the least effort through the opening into the sclerotica. It is an advantage which the instrument of *Dupuytren* does not possess, but one which exposes the eye to be partially emptied of its aqueous humor. The needle of *Beer*, which many German oculists make use of, is straight and spear-shaped, and differs from that of *M. Bretonneau* only in having its body conical and thicker. *Hey* proposed one which has only ten to twelve lines in length, and which in its form approaches much nearer to a chisel than that of a needle ; being a simple modification of that of *Hilmer*, which is conical, its free extremity, which is flattened and terminated in a half moon, is its only cutting portion ; the edges, which are straight and rounded, and its want of a point, make it difficult to wound the iris when we are directing it towards the pupil, while its form of that of a small palette renders the depression of the crystalline less embarrassing. With an instrument of this kind, it would be almost impossible to destroy a membranous cataract, or even to open conveniently the anterior capsule in lenticular cataract, and inasmuch as the breaking up of the lens to which the author specially designed it, can be perfectly well accomplished with any other needle, there is no reason why it should have the preference. MM. *Graefe, Langenbeck, Himby, Schmidt, Spitzac,* (*Fascicul. d'Obs., &c., p. 22, Paris, 1829,*) *Middlemore, &c.,* have also each in their particular way modified the cataract needle. But the difficulty does not lie here. In the hands of a skilful operator, all these instruments are good. In this respect those of Scarpa, *Dupuytren*, and *M. Bretonneau* are quite as good as any of the others. The needle designed by *Guerbois*, (*Journ. des Conn. Méd., t. I., p. 250,*) with a double rest on its concavity, does not present sufficient advantages to be retained. *M. Bergeon* has proposed one which two lines in breadth, and hollowed out in the form of a small spoon, would in my opinion be of dangerous employment ; although it renders the displacement of the crystalline sufficiently easy. If the needle which *M. Charrière* has shown me,

and which when once in the eye opens itself in the manner of a lithotome of F. Côme, did not expose us to the danger of wounding the iris, and of entangling itself in the neighboring tissues, it might possess some advantages. The one which I prefer is somewhat more incurvated and more flattened, without being less in length or much broader than that of Dupuytren.

II. *Scleroticonyxis*.—Up to the eighteenth century, they caused the patient to be seated astride a bench. Barth and Arnemann prefer that he should be standing. Poyet, A. Petit, and Dupuytren, advise that he should be operated on in bed. In France, the patient is generally placed upon a solid chair of moderate height. Beer recommends a stool, and Richter a chair with a perpendicular back, while in England they give the preference to a music stool. In this respect there can be nothing fixed. Though the seated position is evidently the best, the others may also be adopted without serious inconvenience.

a. *Ordinary process*.—The surgeon places himself in front, either on the same bench with the patient, whose knees he holds between his thighs, as in the time of Celsus, with a small cushion to support his elbow, as recommended by J. Fabricius; or he stands up, as Dupuytren and a great number of others advise; or he seats himself on a chair somewhat elevated, in such a manner as to be able to place his foot upon a stool, and to support his elbow upon a cushion on his knee, as directed by Scarpa. When seated, there is more fixity in his movements, since the elbow is supported; when standing up he is more free and more at his ease. Some surgeons separate the eyelids themselves, and dispense with assistants. Barth never operated otherwise. In this respect there has been much praise bestowed upon the skill of M. Alexandre, who again, it is said, is surpassed by Dr. Joeger in Germany. The thing doubtless is possible, but exhibitions of force cannot be taken as a rule, and there is no operation in surgery which more requires an intelligent assistant, than cataract. It is necessary that he should have a light hand, that he should perfectly comprehend every stage of the operation, and all the movements of the operator, and that he should be as practically conversant with it as possible. Being placed behind the patient, he embraces the head, and holds it against his chest with one hand, while with the other he elevates the upper eyelid. Should we desire to have recourse to any instrument to open the eye, the double erigene of Bérenger, or the blunt hook of some others, could evidently be replaced by Pellier's elevator of silver wire. In general the finger is preferable, whether with Scarpa, we make use of it to raise and to keep up the free border of the upper eyelid against the supra-orbital arch, without touching the eye; or whether after the manner of Boyer, we push it (*l'enfonce*) against the posterior surface of the superciliary border, while incurvating its last phalanx in the manner of a hook. By this last mode, the eyelid is found to be more firmly fixed; but the angle formed by the phalangeal articulations, causes more inconvenience to the operator, and the eye runs more risk of being compressed. Forlenze was in the habit of causing the entire tegumentary covering of the eyelid to be drawn towards the eyebrow, as if for the purpose of folding it or forming a border with it

there. In this manner the ciliary border, or tarsal cartilage, is raised as high as possible, and the pulp of the finger leaves less facility for the skin to escape. The most certain means of preventing our loosing our hold before it is time, consists in placing a piece of dry linen between the finger and the integuments, in order to prevent them slipping over each other. If the patient is in bed, the surgeon places himself on the right for the left eye, and on the left for the right eye; adjusts the cap and fixes it with the bandage; covers one of the eyes, whether it is diseased or not, with a small piece of coarse lint, and a long compress passed obliquely round the head. The assistant, free or raised on a chair at the head of the bed, prepares for elevating the eyelid.

*First stage.*—With the forefinger corresponding to the diseased side, the operator depresses the lower lid and fixes the eye. With the other hand he seizes the needle in the manner of a writing-pen, directs its point perpendicularly upon the sclerotica, at one or two lines from the transparent cornea, a little below its transverse diameter; turns its concavity downwards, one of the cutting edges towards the cornea, and the other towards the orbit, in order that he may penetrate, rather by separating apart, than by dividing through, the fibres of the coats of the eye; first inclines the handle of the instrument with a considerable deal of force downwards, then raises it gradually in an opposite direction in proportion as he enters into the posterior chamber, and makes use of his two last fingers in order to procure a point d'appui, between the parotid and the cheek bone.

*Second stage.*—Before plunging it in farther, he turns the instrument upon its axis, in order that its concavity may face backwards, and that he may be enabled to pass without danger below, then in front of the crystalline, while penetrating from without inwards and slightly from behind forwards, without touching the iris or lenticular capsule, if he possibly can, as far as into the pupil and anterior chamber. He then passes its point circularly several times around the anterior circumference of the lenticular body, the envelope of which is in this manner lacerated as completely as possible.

*Third stage.*—This being accomplished, the surgeon applies the arc of the needle directly upon the front part of the cataract, which he then draws by an oscillating movement downwards, outwards, and backwards, into the bottom of the eye, below the pupil and the vitreous humor, where he holds it fixed for the space of a minute, in order that it may not become disengaged.

*Fourth stage.*—The instrument is then drawn back without shaking it, by small movements of rotation; it is brought back to the horizontal position; we again turn its convexity upwards, and remove it from the eye, by making it pass through the same track it had taken in entering.

*Remarks on the preceding different stages.*—Many points in this operation require particular attention.

1. To make use of the *right hand*, for the right as well as the left eye could be of use only to those surgeons who are not ambidexter, and it is not often that these latter venture to perform operations on the eyes.

2. If the *needle* were directed *above the transverse diameter* of the

sclerotica, as some practitioners, and among them M. Pilson, have recommended, it would become almost impossible to depress the crystalline completely, or to avoid leaving it more or less near the centre of the eye. In applying it exactly upon the external extremity of this diameter, we should be certain to wound the long ciliary artery, and to produce an internal hemorrhage. It is below it therefore that we must apply it. When its convexity is turned forward, as Scarpa recommends, the fibres of the sclerotica, as well as some of the ciliary nerves and vessels, are necessarily divided, whereas nothing like this takes place if we conform to the precept which I have laid down.

3. J. Fabricius laid it down as a rule that the *needle ought to be plunged in at the union of the sclerotica and cornea*. Others, with Purmann, say at half a line from this last; some at a line and a half; several at two lines, two lines and a half, and even three lines; there are those who say the breadth of the nail or of the stalk of a straw, the middle of the white of the eye, &c., and those who are in favor of going as distant as possible from it, are influenced by the fear of wounding the ciliary circle or processes. Among others, there are those who, like Platner, apprehend the lesion of the tendinous portion of the rectus externus muscle or the nerve of the sixth pair. Fabricius, in approximating the cornea, specially designed thereby to reach more directly in front of the cataract, while the majority look only to avoiding with greater certainty the retina. As to the fact itself, two things appear to me indisputable: it is that the puncture of the fibrous expansion of the rectus muscle involves not the slightest inconvenience, and that that of the retina is unavoidable when we penetrate through the sclerotica, at whatever distance it may be from the cornea; from whence it follows, as a general rule, that there is no danger in receding from, while there would be in approximating too near to the ciliary body.

4. In turning the *back of the needle forward*, when we wish to pass it below and then in front of the cataract, and to conduct it in this manner in the anterior chamber through the pupil, our object is to protect, with as much certainty as possible, the retina and the iris from the action of its point or cutting edges. If we work with it in the anterior chamber, it is in order to be more certain that it may not work between the lens and its envelope. The laceration of this last is a more delicate and important operation than is generally supposed; it is upon its circumference that we must commence. If we pierced it first at the centre, it would be very difficult afterwards to detach the flaps from it, and to prevent the formation of a secondary cataract. The best mode undoubtedly would be to depress at once both the crystalline and its capsule, without breaking them, as some authors have recommended; but by what mode could we force a membrane so delicate to the bottom of the eye without dividing it, provided that its adhesions have retained some degree of firmness?

5. It is not sufficient, in order to depress the opaque body, to seize it with the point of the needle. The *concavity of the instrument* ought moreover to embrace exactly and flatwise its anterior surface at its middle portion, from the inner side of the pupil as far as to its outer portion; otherwise it would be reversed upon the slightest de-

gree of pressure, either from above downwards or from below upwards. The depression having once commenced, the needle represents a lever of the first kind, which finds its point d'appui in the opening of the sclerotica, and which, in order to make resistance outwards, backwards and downwards, should have the concavity of its point slightly inclined upwards, while we give to it the oscillatory movement mentioned.

6. *When the cataract is depressed*, it is recommended to the patient to look upwards and inwards without moving the head, supposing by that, but erroneously, that the crystalline would be made to descend lower down. In not withdrawing the needle until at the end of some seconds, time is given to the depressed cells of the vitreous humor to resume their natural position, and to imprison, so to speak, the cataract, which would almost mount upwards if we left it immediately. The small movements of rotation which the instrument is made to perform before disengaging it from the eye, have evidently for their object to disturb the crystalline as little as possible, and to be more certain of leaving it in its new locality.

7. If, notwithstanding all these precautions, the cataract mounts upwards again as soon as we cease to keep it depressed, we must seize it a second time and depress it farther down, and continue in this manner until it rises up no longer.

8. *When it is soft* the instrument ruptures it, and we rarely succeed in entirely depressing it below the pupil; in such cases, if it is not practicable to displace its fragments backwards, we endeavor to break it down into small particles, which are to be pushed forward into the anterior chamber, in order that their solution by the aqueous humor may prepare them for absorption. It is also to this place that we must direct every opaque particle which may be found to remain in the centre of the eye after the displacement of the crystalline. The foreign corpuscles are in this manner easily pushed forward in front of the pupil, provided they are completely liberated. Unfortunately the case is not the same, when our design is to place there the flaps from the crystalline envelope. In this case we must have skill and address to transfix, so to speak, each flap in succession, from before backwards or behind forwards, with the point of the needle near the centre of their base, and to detach them while rolling them up upon themselves, or by drawing them on the side near their apex. If the capsule adheres to the uvea we ought, before all other things, to effect its separation, and in doing this avoid the iris as much as possible. Upon the supposition that some circumstance may occur to prevent this disunion, we should necessarily be obliged to displace the crystalline at first, and act afterwards upon the anterior layer of the capsule, as has been described above.

9. *Crystalline in the Anterior Chamber.*—The cataract, at the moment of the operation, may, in consequence of some sudden movement of the patient or the operator, escape through the pupil and fall into the anterior chamber. This may also happen spontaneously from various causes, as blows, falls, sudden strokes, and anything which may concuss the head of the individual, or in any manner bring about the rupture of the lenticular cyst. This circumstance does not necessarily oblige us, as has been supposed, to resort

to the extraction of the displaced disc. Inasmuch as it has gone through the pupil, in order to place itself in front, it could traverse it again to get behind, and it will always be found more agreeable, both for the patient and the surgeon, to terminate the operation while the needle is in the eye, than to withdraw it again in order to incise the cornea. In the cases even where nothing yet has been attempted, it is no obstacle to depression, provided the pupil remains dilatable and that there is but very little degree of inflammation. Dupuytren and M. Luzardi, who, under such circumstances, have made use of the ordinary needle, have plunged it through the sclerotica and pupil into the anterior chamber, in such manner as to seize hold of the lens, whether opaque or not, and which they have afterwards succeeded in conducting into the bottom of the posterior chamber. I have frequently noticed this accident, but it never has appeared to me of serious character at the moment of the operation. There are, moreover, some singular facts in relation to this subject. In a patient of M. Monod the crystalline remained in the anterior chamber. This woman, having left the Hospital of Cochin, came to the clinique two months afterwards. I then noticed that the crystalline occupied its usual place in the posterior chamber.

Having left my service at the expiration of six weeks, the patient came back again three months subsequently, when the crystalline was again found in the anterior chamber, having vessels which appeared to have penetrated into it, and where, being now reduced to a third of its volume, it appears to constitute a part of the cornea! In another case the crystalline having passed into the anterior chamber several months after depression, repassed into the posterior chamber while Pellier (*Gaz. Salut.*, No. 50, p. 4, col. 2, 1760,) was dividing the cornea in order to extract it.

10. In *milky cataract*, if as almost always happens, the capsule itself is affected, it is almost indispensable to carry the instrument as far as to the centre of the pupil without dividing anything, otherwise the opaque liquid diffuses itself into the eye, renders the humors turbid, and prevents us from any longer seeing what we are doing. Nevertheless should this accident happen, and whether the needle was or was not in the anterior chamber, we ought before withdrawing it, to simulate as accurately and with as much caution as possible, the manipulations necessary to break down whatever it might be necessary to destroy.

11. *Purulent cataract*, of which I have seen two very marked examples, would require no additional attentions, as its absorption is also speedily accomplished.

12. If, as I have often seen, the *cataract* should, on the contrary, be very *hard*, stony, cretaceous, or like *tupha*, (*tophacée*,) which is recognized by its unequal, ridgy, and white or yellow calcareous color, we should treat it in the same manner precisely as an ordinary crystalline, except that its capsule being folded and retracted, and, as it were, parched up, cannot be isolated from the rest, and must be depressed with the same stroke. Should the cornea, (*Darct, Thèse citée*,) the crystalline, (*Kulm, Chir. des Hopit.*, t. III., p. 397,) or vitreous humor (*Middlemore, Revue Méd.*, 1838, t. III., p. 269,) be ossified, any operation doubtless would be useless.

*b. Other Processes.—1. Process of Petit.*—At the commencement of the last century, some authors sustained, contrary to Hecquet, de la Hire, &c., that the seat of the cataract was always in the crystalline. Petit, adopting this hypothesis, proposed to accomplish the depression of the opaque body without touching the anterior layer of the capsule. After having plunged the needle into the posterior chamber, he inclines one of its cutting edges outwards and backwards; opens into the vitreous humor in this direction; brings the needle back to the outer, lower, and posterior part of the capsule, which he ruptures, secures the crystalline by hooking into it, and passes it into the substance itself of the hyaloid body, while conforming in other respects to the general rules for depression. *This modification*, revived some years subsequently by Ferrein, who declared himself the inventor of it, was afterwards supported by Henkel, Gunz, Gentil, Walsbom, &c. In allowing the anterior capsule to remain intact, it was to reëstablish the vision more completely than by the ordinary process. It was maintained that in falling upon a convex membrane the luminous rays would scarcely feel the loss of the crystalline: that the concordance of the focus of vision would be preserved; and that we should not in fact be under the necessity of using spectacles after the operation. To these reasons, practitioners objected that the capsule is frequently itself the seat of cataract, either alone or conjointly with the crystalline; that more often still it becomes opaque afterwards, and produces a secondary membranous cataract, should we fail to destroy it at the time of the operation; that consequently, so far from preserving it, we ought to endeavor to break it up as thoroughly as possible; finally, that in depositing the crystalline exclusively in the vitreous humor, in place of simply depressing it into the posterior chamber, we should run the risk of producing serious accidents.

*2. Process of the author.*—The last objection raised by the adversaries of Petit is the only one destitute of foundation. If the laceration of the vitreous body were dangerous, the operation for cataract by depression would scarcely ever succeed, for it is almost impossible to be avoided. Should not the crystalline enter, to some extent, in spite of the operator, into the vitreous humor, can it be supposed that it would ever remain depressed, pushed back as it continually would be by the natural elasticity of the hyaloid membrane? Moreover, in causing it to glide between the coats and humors of the eye, how could we avoid lacerating the retina? Proceeding upon this idea, M. Bretonneau has deemed it advisable to adopt the process of Petit by modifying it; that is to say, that in place of opening the capsule posteriorly, this surgeon, after having traced out a passage for the crystalline into the vitreous humor, proceeds to the rupture of the capsule in front as by the ordinary process. Being a witness of the successes obtained by this process at the Hospital of Tours, in 1818 and 1819, I have adopted it without having had any reason to regret it. I perform it in the following manner: the needle is directed as if to pass behind the cataract; when it has arrived at about four lines of depth, before changing its position, we incline it downwards, backwards, and outwards, in order to open into the anterior cells of the vitreous humor; immediately afterwards, we turn its back towards the iris; then while ele-

vating its handle, we cause its point to pass under the lower border of the crystalline, that it may afterwards be conducted into the pupil; then lacerate the anterior layer of the capsule; seize the opaque body, and push it by a well regulated vibratory movement, in the direction of a line which would extend from the great angle of the eye to the mastoid process on the same side. We thus avoid wounding the iris; the elasticity of the vitreous humor, though sometimes quite considerable, cannot however offer the least degree of resistance, and enables the cells of its membrane, while immediately closing the passage, to become an obstacle to the reascension of the crystalline.

3. *Another process.*—I have often also employed another process which has appeared to me to be very convenient. In place of inclining the needle downwards, I direct it upwards, and from behind forwards, in order to bring it above and in front of the crystalline, and into the pupil. By this means we more completely detach the cataract, and nothing is more easy afterwards than to force it backwards and downwards.

4. An itinerant oculist, *M. Bowen*, has published a method which he calls hyalonyxis, and which appears to him preferable to every other. His object is to traverse the vitreous humor from behind forwards, then to lay open the posterior layer of the capsule, and to detach the crystalline after the method of Petit or Ferrein, without interfering with its anterior envelope. For that purpose *M. Bowen* pierces the sclerotica at four lines from the cornea. The results of his practice are all in favor of hyalonyxis, for he scarcely counts two failures out of twenty operations. From this therefore we may at least conclude, that the wounding of the retina and the vitreous humor is a matter of very little consequence. I do not see, moreover, any advantage in going so far from the cornea, and there is no necessity of recalling the inconveniences to which we are exposed in not destroying the anterior layer of the capsule. Nothing moreover would prevent our avoiding it, if we desired to do so, by the process which I have adopted.

5. *M. Ruete*, (*Gaz. Méd.*, 1838, p. 677,) in causing his needle to penetrate at the *side of the capsule* on a line with the pupil, then turning the point of his instrument forwards, in order to rupture the envelope of the crystalline, and proceeding afterwards to the depression of the cataract, has in this process done nothing more than what often happens to other surgeons without their being aware of it.

6. *M. Goyrand* plunges his needle into the vitreous humor from behind forwards like *M. Bowen*, and immediately causes it to perform a circular movement upon the whole circumference of the crystalline, which latter he transfixes in order to drag it into the vitreous humor, without paying any attention to the anterior capsule. I have seen him operate in this manner with great rapidity.

7. *M. Gensoul* formerly made use of a process, which he soon after abandoned, but which *M. Roux* has since thought proper to make trial of at Paris, and the idea of which seems to belong to *B. Bell* or to *M. Giorgi*. A small incision is first made behind the iris, at the union of the sclerotica with the cornea. The surgeon introduces through this opening, a sort of scoop to the fore part of the

crystalline, which he pushes down or depresses, and the operation is thus terminated. The only advantage from so large an opening of the sclerotica, would be in giving relief more easily than by a simple puncture to the too great degree of fullness of the eye, (*trop plein de l'œil.*) But the division of the ciliary body, the possible escape of the humors, and the impossibility of carrying the cataract sufficiently far backwards, would of themselves suffice on the face of them to cause this process to be forever proscribed, though even the trials of its inventors and of M. Roux, did not come to our assistance to demonstrate its inconveniences and dangers.

8. *Reversion or Reclination.*—Since the time of Pott, some authors, among others Willbourg and Schifferli, have maintained that in place of depressing the crystalline, it would be better to effect its reversion. We cannot deny that this modification would render the operative process both more simple and more easy. When the needle has lacerated the anterior capsule, all that is necessary is to apply it a little nearer to its superior than to its inferior border, in order that by pressing upon it, the reversion of the lens may be effected at the moment by an oscillatory movement, which places its anterior surface above, and its superior border behind. If we desired, moreover, to drag the cataract into the substance, or below the vitreous humor, as Beer, Weller, and others recommend, reversion evidently becomes the usual mode of depression, whereas, if we should abandon it in the posterior chamber, below the centre of the pupil, it is clear that it will in most cases reascend, or that its presence would irritate the iris and the rest of the eye to such a degree as to give rise to accidents. Reversion then, is only a dernier resource, and never a process of election.

9. *Discision or breaking up.*—Pott, after having endeavored to demonstrate that the crystalline, when it is once placed in immediate contact with the aqueous humor, is dissolved, and ultimately disappears, wished also to prove that it is not indispensable to depress it below the axis of vision; that it is sufficient, as Warner had advanced, to reduce it into fragments; that in fact, as Ware pretends, a cure may be effected by rupturing its capsule. Experience has occasionally confirmed this opinion, for the examples of solution and absorption of the crystalline, whether it was left entire or broken up into fragments, are not uncommon. As on the other hand, the breaking up of the crystalline relieves us of the most difficult point of the operation, it is very natural that M. Cappuri, (Paccini, *Bull. de Féruccac*, t. XIV., p. 192,) as well as many other oculists, should have adopted the opinion of M. Adams, who recommends that it should be made use of in all cases. Nevertheless, I will say of this the same thing that I would of reversion. It is a process which is to be adopted when the cataract is soft or too difficult to be displaced, but it is one which, notwithstanding the eulogiums bestowed upon it by M. Parmi, is less certain than depression properly so called. If it is true that the fragments of the crystalline are sometimes dissolved with sufficient rapidity, it is also true that very frequently they remain there for months, and even to an indefinite period, and in such way as to prevent the re-establishment of vision. If the wounding of the vitreous humor is thereby less difficult to be avoided, that of the

iris is ordinarily more so. Upon the supposition that there might be some advantages in leaving the cataract to be gradually absorbed, they will be found more than counterbalanced by the anxiety of the patient, and the loss of time which must elapse between the moment of the operation and the period when the pupil is again restored. I am still less capable of comprehending M. Lowenhardt, (*Gaz. Med.*, 1838, p. 812,) who has had the temerity to pass a seton through the crystalline in order to cure the cataract, and who declares that he succeeded! All the needles are good for effecting discision. That of Beer, or M. Lusardi's small needle, in the form of a sickle, seem more convenient, however, than those of Hey and Dupuytren, and even than those of Scarpa and M. Bretonneau. Although we may break up the crystalline by attacking it on its posterior surface, it is, nevertheless, preferable to act upon its opposite surface, in order that we may be better enabled to see what we are doing, and to be more certain of avoiding the iris. In this mode, when the instrument has once arrived in the pupil, and that the capsule has been properly ruptured, we direct its point and one of its cutting edges upon the middle of the cataract, which latter is divided at first into two parts, in order to return upon each fragment separately, in order that they may be reduced into as small particles as possible, after which we endeavor to push the largest of them into the anterior chamber, by means of the back of the needle. When we operate from behind forwards, and employ the straight needle, the breaking up of the lens is in reality more easy, so long as the anterior layer of the capsule remains entire, because the crystalline being then shut up as it were in a sac, and unable to escape, is compelled constantly to present itself to the action of the instrument; but the vitreous humor suffers much more than by the other process, and it is very rare, moreover, that the lens and its envelope are not pierced through and through at the very first movements.

III. *Keratonyxis*.—Depression, reversion, and broiement, which are generally performed, as we have just seen, by scleroticonyxis or by sclerotico-hyalonyxis, are also accomplished by keratonyxis, that is to say, by penetrating through the transparent cornea. This process, whose invention has been disputed by many moderns, is far from being new. Avicenna speaks of practitioners who first opened the cornea and penetrated by that means to the crystalline, which they afterwards depressed by means of a needle that they denominated *al-mokadachet*. Abu'l-Kasem asserts positively that he adopted this method, and that when the needle is plunged into the crystalline, some gentle movements are required to be made upon it in order to depress the cataract. M. Herbeer (*Carron du Villard, Oper. de la Cat. &c.*, p. 11, 239,) affirms that this has been the practice in Egypt from immemorial time, and M. Souty, (*Ibid.*, p. 241, 1834,) makes the same remark of the medicastres of India. Manget also relates the case of an English woman, who cured cataract by piercing the cornea. In the collection of Haller, we find a thesis supported by Col. de Vilars, under the presidency of Le Hoc, in which this operative process is much extolled.

It is in this manner, says the author, that birds recover their vi-

sion by plunging a thorn into the eye, and it is thus, according to Galen, that goats have pointed out to man the manner of operating for cataract. In the 18th century, Smith had already revived the process of the Arabs. Dudell, the disciple of Woolhouse, considering cataract almost always membranous, proposes that we should penetrate the cornea to reach the anterior capsule, and to remove from it a circular disc by means of the needle, in such manner as to form there a sort of window to give passage to the rays of light. The famous Taylor and Richter frequently performed keratonyxis in cases of milky cataract. Gleize in France, and Conradi in Germany, made it known in the year 1786. In 1785, Beer had performed it twenty nine times. Demours had performed it in 1803, the epoch at which Reil had endeavored in his lectures to call attention to it, and when he gave it the name which it bears. But it has required no less than the united efforts of Buckhorn in 1806 and 1811; Langenbeck, in 1811 and 1815; Dupuytren, Guillé, and Walther in 1812; Wernecke, in 1823; and Textor and Pugin in 1825, to assign it a place among regular operations.

*a. Operative Process.*—The patient and the assistants are placed in the same manner as for scleroticonyxis; the surgeon directs the point of a curved needle, that of M. Bretonneau, for example, or that of M. Langenbeck, which, though more pointed, has a cutting edge of less extent, at about a line from the sclerotica; supports the back of it upon the finger which depresses the lower eyelid; causes it to penetrate into the anterior chamber at the lower or external part of the cornea; arrives in the pupil; then turns downward the concavity of his instrument, which up to this moment he had held in an opposite direction in order to avoid the anterior surface of the iris; freely lays open the capsule; detaches the crystalline; hooks its upper border; depresses and reverses it; endeavors even to push it below the pupil into the vitreous humor, or what is better. comminutes it, and breaks it up and depresses its principal fragments when he cannot bring them into the anterior chamber; and afterwards turns the back of his needle downwards again, and withdraws it by making it pass through the same track in an opposite direction to that by which it was introduced.

*b. Appreciation.*—Keratonyxis should not be attempted until we have previously produced a sufficiently extensive dilatation of the pupil, the borders of which nevertheless it is very difficult in spite of this precaution, to avoid wounding severely, when we are endeavoring to depress the crystalline. It is to obviate this inconvenience, and especially in order not to puncture the iris, that straight needles among us have generally been proscribed, and that we penetrate at some distance from the sclerotica, taking care at the same time not to approximate too near the centre of the cornea. The pyramidal needle of Beer, the shoulder that M. Graefe has caused to be added to the stem of the ordinary needle to prevent its penetrating too deep, the needle of Himly, and that of Schmidt, &c., do not in reality present any advantage over those which are used in France, and require no further description in this place. In animals this process is preferable to all others, for reasons which it is unnecessary for me to point out. Though in the human species it may in fact be em-

ployed wherever depression is practicable, it is not advisable to make choice of it except for milky cataract, and in children and intractable subjects, and where the eyes are very movable and irritable or deeply depressed. The same hand will answer for both eyes; no nerve or vessel incurs any risk of being wounded. The retina remains intact; nor is the iris in more danger than by the posterior method. The tissues that are traversed have scarcely any sensibility, nor does the membrane of the aqueous humor, which MM. Wardrop, Langenbeck and Chélius appear to have so much dread of wounding, possess any more than a very slight degree of vitality. The operation then resolves itself definitively into a simple puncture, and may be repeated a certain number of times without any serious inconvenience. But to these advantages no less numerous objections may be opposed. The adhesions of the capsule, the contraction of the pupil, the narrowness and flattened form of the cornea, the projection of the iris, and hard gypseous or stony cataracts, do not appear to be adapted to it. Properly understood, it is for the breaking up and reversion of the lens only that we may sometimes have recourse to keratonyxis. Though it has succeeded in seven times out of eight with M. Textor; that in many hundreds of patients, M. Smalz, according to M. Eccard, has never seen it produce suppuration of the eye; that out of 345 cases of M. Walther, he failed only in twenty-six; Dupuytren, in one out of six; and M. Langenbeck, in four only out of 112, this process nevertheless has been abandoned as a general method, by even its warmest partisans themselves. M. Wedmeyer, who has performed it fifty-three times, rejects keratonyxis as well as M. Langenbeck, and M. Schindler, (*Bull. de Fér.*, t. X., p. 352-354,) who prefers in this operation to pass through the centre of the cornea, will not succeed in giving it any great degree of popularity. Nor do I think that M. Pauli, (*Arch. Gén. de Méd.*, 1838, t. III., p. 352,) who, penetrating at the cornea, then divides the vitreous humor above the crystalline in order afterwards to perforate through this opening through the entire body of the lens, will ever succeed in causing his method to be adopted. Nor can I comprehend any better the superiority of what M. Quadri (*Gaz. Méd.*, 1833, p. 643) calls his *mixed method*. How is it possible that a sort of *forceps-needle* introduced through the cornea in order to extract the capsule of the crystalline, while the cataract is being depressed by means of an ordinary needle passed through the sclerotica, could render the operation more simple, more sure and less dangerous? I conclude therefore that keratonyxis cannot be substituted for scleroticonyxis, which alone enables us to push the crystalline without extracting it, outside of the visual axis, and to fix it there securely, promptly and permanently; and that in fact it only deserves a place in books of surgery under the character of an exceptional method.

c. As to the simple *puncture of the cornea*, as formerly practiced by Lehoc, and more recently by M. Wernecke with the view of promoting the solution or absorption of the cataract, it has not yet sufficient proofs in its favor to authorize its being formally recommended. If nevertheless, as cannot be doubted, the decomposition of the crystalline separated from its membrane, is a phenomenon much more chemical than vital, we cannot see why the evacuation of the aque-

ous humor, when once impregnated with the foreign substance, might not favor the dispersion of the cataract, in permitting the liquids with which it is surrounded to be renewed.

*IV. Operation for Cataract in Children.*—In the early period of life, we can scarcely have recourse to the method of extraction. We should rarely succeed in accomplishing it without emptying the eye. As is demonstrated by the observations of Scarpa, Ware, Saunders, Gibson, M. Lusardi, and M. Lawrence, who has seen it in four brothers, &c., congenital cataract and accidental cataract in young persons are almost constantly liquid and membranous. There is consequently but little to do with depression or extraction. The object to be attained is to lacerate as completely as possible, the anterior disc of the capsule, and to empty it of the matters that it contains. In such cases it is a matter of indifference whether we operate by keratonyxis or scleroticonyxis, at least when the pupil is very large, a condition which ordinarily exists. The most difficult point is to restrain the little patient. Ware confines himself to placing him upon a table, raising his head by means of pillows, keeping him held down by assistants, and holding the eye steadily by means of the fingers, while another assistant raises the upper lid with the elevator of Pellier. Gibson, who first gives an anodyne potion to blunt the sensibility, causes the most intractable to be imprisoned in a sort of sack, open at both ends, and which is confined above the shoulders and below the feet by means of a running string. Finally, M. Lusardi finds it more commodious to seat the child upon the angle of a prepared table, after having fastened his arms around his trunk and placed his legs between the thighs of the operator. Whether we penetrate through the cornea or the sclerotica, it is always important to effect a complete loss of substance at the anterior disc of the capsule, and not to confine ourselves to its simple rupture, unless we wish to incur the risk of seeing a secondary cataract supervene soon after. If the crystalline should still retain some degree of resistance, and if it should appear that the capsule itself ought to be broken up into fragments, it would become necessary, as in an adult, instead of leaving them in their place, to force them into the vitreous humor or push them forward into the anterior chamber. If at the expiration of fifteen or twenty days, any fragments should remain at the place of the crystalline, Ware recommends that we should repeat the operation, without waiting any longer, and states that he has performed it four or five times successfully in this manner on the same child. Such a course of procedure ought not to be imitated, unless we have satisfied ourselves that the fragments of the cataract have absolutely ceased to diminish in volume. This perhaps would be an occasion for making trial of the process of Werneck, and of evacuating the aqueous humor by a puncture in the cornea.

*V. Subsequent Treatment.*—When everything is finished after the operation for cataract by depression, the patients are recommended to keep the eyelids gently closed. The practice of placing before the patient some object to ascertain the result of the operation should be abandoned by all practitioners. The light arriving in full force and suddenly into the bottom of the eye, irritates the retina too severely, and such a test in every respect can only be intended to

gratify an idle curiosity. After the employment of the needle especially, it must completely fail in its object, since the disturbance we have just produced in the chambers of the eye may render the sight very confused at first, though it is to be completely re-established afterwards. Nobody at the present day would venture to follow the recommendation of Purmann, by applying over the puncture of the sclerotica, a small piece of gold-leaf, with the view of preventing the escape of the aqueous humor or the vitreous body.

Brandy and the white of an egg, employed by the ancients, and a thousand other topical applications lauded without any foundation, are also proscribed. We confine ourselves to wiping out the eyelids with a sponge or a fine compress, then placing in front of them the oval piece of linen perforated with holes, dry or imbued with cerate, and over these a soft compress of lint, and a bandage of linen, which is arrested under the nose by the bridle formed by its notch, and which is fixed behind to the cap by means of some pins; finally, the band of taffeta which is to cover the whole. It is important that none of these portions of dressing should be drawn so tight as to compress the parts contained in the orbit. For myself I confine myself in most cases to the employment of a simple bandeau, which bridles the nose, and which I attach to the cap behind by means of pins. The patient operated upon should make no effort nor any movement. Being carried back to his bed he is to be laid upon his back, with the shoulders and head elevated by means of pillows. The habit of surrounding him with thick and colored curtains, and of allowing but little light to penetrate into his chamber, has appeared to me to be more hurtful than useful. During the space of three or four days we allow him only bouillon or light soups. If the stools are not regular, emollient cathartics or even laxatives are to be administered. We may give him also, for example, a drink of a more or less relaxing character, such as whey, barley-water sweetened, syrup of prunes, veal broth, or decoction of tamarinds. However little cephalgia, heat of skin or febrile movements, may supervene, bleeding is not to be omitted. When nausea and vomiting should at the same time be present, laudanum by injection, as Scarpa recommends, is indicated and produces very good effects. In ordinary cases the usual drink to be employed is infusion of linden, violet or wild poppy, sweetened with some syrup. Loss of sleep and restlessness are to be relieved by an ounce of syrup of white poppy or diacodium made into a julep, which is to be taken by teaspoons full. When no serious accident supervenes we do not uncover the eyes until the third or fourth day; while everything goes on well it is perfectly useless to examine them before that time. Should any accident occur we should be apprised of it by the state of the pulse, the cephalgia, the pain in the orbit, the running of the tears and the saturation of the dressing by a yellow discharge. To perform the dressing the patient must be first seated. The different portions being removed, a basin with warm water is placed under his chin, and by means of a sponge he himself moistens and separates his eyelids, which he immediately opens after the operator has wiped them. At this time the curtains are to be closed. Even though the pupil should appear to be regular, it is scarcely yet prudent to undertake to ascertain the extent to which the sight

is re-established. The dressing is to be reapplied and renewed every day, and we proceed in the same manner as in cases of simple ophthalmia, while the eyes retain their redness. If everything goes on well we allow at every dressing a little more light to fall upon them, in such manner that at the expiration of twelve to fifteen days they may be left uncovered and protected only by a simple shade of dark taffeta. Nor is there any longer any necessity of the diet being very rigid, and the patient may get up in the course of the second week, resuming by degrees his customary regimen. I have frequently even made them or allowed them to get up at the beginning of the fourth day. Under a contrary state of things, we must look to the kind of symptoms which are developed, in order to employ in good season, antiphlogistics, general or local, purgatives, revulsives, and collyria, of this or that description, in the same way as we would do in a disease of the same kind produced by any other cause, not forgetting at the same time that iritis, retinitis, and choroiditis are under these circumstances the accidents that we are especially to endeavor to prevent or to combat.

*D. Operation for Cataract by Extraction.*—Cataract was still but very imperfectly known, both in respect to its seat and its nature, when it was already proposed to extract it. Antylus, according to Sprengel, opened the cornea by means of a needle, and proceeded to seize hold of the opaque pellicle through the pupil, in order to extract it. Lathyrus operated in the same manner. It appears also that Galen practised incision of the cornea in front of the membranes, in order to extract the cataract. Ali Abbas and Avicenna speak of extraction as a common method. Abu 'l Kasem states that he learned from an inhabitant of Irack, that in that country the practice was to introduce a short needle into the anterior chamber in order to void the cataract. Avenzoar and Isa Ebn-Ali, who reject it, state that in their time it was in general use in Persia. G. de Chauliac himself has not forgotten it; and Galeatus, who extols it greatly, gives himself out as its author. Entirely forgotten, however, or laid aside, by the authors of the middle ages, the operation for cataract by extraction does not appear to have been revived in practice until about the end of the seventeenth century and the commencement of the eighteenth. In 1694, Freytag laid open the cornea in the manner of the Arabs, and succeeded afterwards in extracting from the eye an opaque membrane, which doubtless was no other than the anterior layer of the capsule of the crystalline. Woolhouse passed through the anterior chamber with a needle arranged in such manner as to be susceptible of being transformed at pleasure into a forceps, and which enabled him afterwards to seize hold of the opaque body in order to effect its extraction. Petit, effecting, in the presence of Méry, the extraction of a cataract which had fallen into the anterior chamber, surprised many of the assistants by showing to them an opaque crystalline in place of the pellicle they had expected to see. St. Yves also decided upon extracting the crystalline lens, but without success, which induced him, but we do not see for what reason, to maintain more strenuously than ever that cataract does not have its seat in the body of the lens. These different attempts had then scarcely attracted any attention when Daviel, in 1748, submitted

his method to the judgment of the Academy. By means of a large instrument shaped like the tongue of a carp he opened into the lower part of the cornea; the wound in which he afterwards enlarged by means of a second instrument narrower than the first, or by small curved scissors. A gold spatula to keep the lips of the wound open; a needle of the same metal, which was flat and triangular, for the purpose of opening the capsule, and a scoop to favor the issue of the crystalline or its connections, were also necessary to this surgeon. A crystalline which had fallen into the anterior chamber, had obliged him to put his process in practice for the first time in 1745. One hundred and twenty-two cures out of two hundred and six operations, as announced by him, made a vivid impression on the public mind; and although the Caqué of Reims had mentioned only seventeen successful results out of thirty-four operations, every body, nevertheless, was anxious to repeat his essays. *Pallucci*, who professed, in 1752, to have performed extraction before David, opened the cornea from the small to the great angle of the eye by means of a knife, the apex of which being very much elongated, resembled a kind of needle. *Poyet* devised a narrow instrument, pierced near its point in order to pass through this eye a noose or thread, which would be capable of supporting this organ while the flap of the cornea was being made from above downwards. *La Faye* proposed to substitute for all these instruments of David, a knife in form of a lancet, somewhat narrow, slightly convex on one of its sides, and the back of which was blunt up to near its point. To these he added a cystotome, a sort of triangular lance, supported by a padded spring, (*ressort en boudin*.) and enclosed in a sheath which was dilated in its middle in such manner as to resemble the body of a syringe. *Beranger* soon after modified the keratotome of *La Faye*, gave it more breadth, rendered it flat on one side, convex on the other, and much thicker, especially on its back. *Sigerist* gave still greater length to the point of *Palluci's* knife, in order to open into the capsule by traversing through the anterior chamber. But *Jung* has remarked, with great propriety, that a cataract needle is much better than any particular kind of cystotome for this last stage of the operation. It was during this state of things that *Richter*, who appeared in Germany, *Wenzel* in France, and *Ware* in England, definitively established the rules for the method by extraction. Two methods have been proposed for extracting cataract. One, but little known in France, bears the name of *scleroticotomy*; the other, almost the only one in use, is called *kératotomy*. The same *preparatory steps* are applicable to them. The pieces of dressing are similar to those which are required for depression. Nevertheless the position of the patient, assistants and operator, require still more exact precautions than in this last method.

It is for extraction especially that *Richter* and *Beer* urge the necessity of a chair with a solid and vertical back, against which they assert it will always be more easy to keep the head of the patient immovable, than by supporting it against the chest of an assistant. The horizontal position proposed by some, and extolled by *Rowley* and *Pamard*, is nevertheless but rarely adopted; doubtless, because it is a little inconvenient for the surgeon. I have often made use of

it, and do so daily, and I confess I never have been able to comprehend why it is not more frequently had recourse to. In that case, it is necessary for the surgeon to place himself upon the side of the eye affected. Should it not, however, be adopted, and that it should be thought preferable to place the patient on a chair, it is, if not indispensable, at least more convenient for the surgeon to stand up than to be seated before him. The speculum devised by F. Aquapendente, still employed by Sharp, and modified by Heister, the instrument of Van Wy (*Arrachard, Dissert., &c.*, p. 69, 106, Paris, 1805,) the ring of Bell or Assalini, which M. Lusardi has placed upon a handle and reproduced under a new form ; the erigines of Sommer, and all the other instruments invented to separate apart, elevate or depress the eyelids, which are useful when we have not a sufficient number of expert assistants, are advantageously replaced by the fingers. Almost all of them incur the risk of compressing or of emptying the eye. The same remark may be made of *ophthalmostats*, among which are to be mentioned the forceps of Ten-haaf, the pique, the stem of which Casamata caused to be curved into an S, in order that it might be better accommodated to the form of the nose, which Rumpelt attached to a sewing thimble, in order to use the middle finger while the forefinger of the same hand depresses the lower eyelid, and to which Demours wished to add another modification by mounting it upon a thimble open at its two ends. The trefoil (*tréfle*) of Pamard, such as the son-in-law of the inventor made known in 1825, is liable to nearly the same objections. I find it less dangerous, however, than to apply the two first fingers of the assistant and the operator in the great angle, as is recommended by Ware, to prevent the eye from inclining inwards, and to compress it up to the moment at which the knife terminates the flap of the cornea. The species of elevator, the kystotome forceps, the double keratotome of M. Martin, the instrument contrived by M. Bonnefin (*Thèse*, No. 41, Paris, 1837), are doubtless constructed with sufficient ingenuity, but may be too easily dispensed with to make their utility a matter of importance with surgeons. The ophthalmostat of M. Fardeau (*Journ. Hebd.*, 1835, t. IV., p. 117,) differs from that of M. Lusardi in this, that in place of a prominent arc, it carries on its ring a kind of large concave and blunt nail (*ongle*). That which I have proposed, (*Estevenet, Journ. Hebd.*, 1836, t. II., p. 147,) has some analogy with the ancient probe of Segwart ; resembling in its handle the ordinary keratotome, it is composed of a small plate of shell, slightly curved on its flat side, and which, moreover, represents the scoop of Daviel. Being perfectly blunt and destitute of any kind of roughness, this plate irritates the parts in no respect whatever. As soon as the point of the knife has passed through the cornea at the side of the great angle I glide this instrument below and between it and the sclerotica, in such manner, that by holding the eye immovable in that position, I render it impossible for it to become displaced inwards, giving at the same time a point d'appui to the keratotome, which allows me every liberty desirable for completing the section of the cornea.

I. *Scleroticotomy*.—B. Bell, after making some trials upon the dead body, averred that it was full as easy to extract the cataract by the

sclerotica as through the cornea. This idea, the first application of which upon living man was made by Earle, and which was revived by D. Lebel and M. Giorgi, has been definitively adopted by M. Quadri, of Naples, who founds upon it his new method or that of scleroticotomy. An incision of about three lines in length is first made by any keratotome whatever, upon the sclerotica at two lines from the cornea. The crystalline and its envelope are then seized hold of by means of a small pair of forceps, and the whole extracted through the outer angle of the eye. In proceeding in this manner, M. Quadri affirms that he failed but in four instances out of twenty-five operations. The first stage of the operation is less difficult, and exposes perhaps to fewer immediate accidents than the ordinary method, nor can it be very difficult to seize hold of the cataract; but how can it be embraced with sufficient firmness to enable us to bring it through the opening of the sclerotica without emptying the eye? How can it be believed that so large an incision through the three principal coats of the eye, will not, in a majority of instances, be accompanied by an internal hemorrhage, wounds of the ciliary nerves or vessels, and followed by accidents a hundred times more serious than those which take place after the opening through the transparent cornea?

II. *Keratotomy*.—Extraction, properly so called, is composed of three different stages: the incision of the cornea, the opening into the capsule, and the expulsion or extraction of the crystalline through the incision whether made upon the inferior or superior half of the eye. The *instruments* employed to effect this have varied considerably, and are far from being the same with all operators. In France, they freely employ the knife of Wenzel, the inventor of which, Richter, (*Bibl. Chir. du Nord*, p. 212,) has so severely censured, and which differs from that of La Faye only in this, that neither of its sides is more convex than that of the other. Some practitioners however prefer the keratotome of Richter, the blade of which, which is very pointed, expands from the point towards the handle in such a manner that it may divide one half of the segment (limbe) of the cornea while traversing the anterior chamber. That of A. Pamard resembles half a myrtle leaf, and has, upon its upper border, which is straight and blunt, a small rib, in order to increase its force. Ware's knife, which is generally employed in England, is almost in every respect similar to that of Richter, and the instrument of Beer, so much praised in Germany, differs from it only by the shortness of its point, and in having a little less degree of length in its blade, which latter, moreover, is somewhat broader. Béranger has proposed one which is convex on one side, flat on the other, and somewhat broader than that of La Faye. Lobeinstein gives it still greater breadth, and slightly elongates its point. Under this form, its convex side, turned backwards, protects the iris, while its plain surface glides behind the cornea. This knife, slightly modified by B. Bell, has since been improved by Jung, one of the most skillful contemporaries of Beer. According to Sprengel, the keratotome of Jung, which is convex on both sides, and cutting on both its edges, is very short and somewhat broader than is necessary to divide with one stroke half the circle of the cornea. According to M. Harel, on

the contrary, the knife should be like that of Lobstein, convex only on its posterior side, and should resemble a kind of guillotine. Finally, that of Barth is distinguished from the preceding by the small notch which is found near its back on one of its sides. The important point in the midst of so great a number, is to choose an instrument whose form and dimensions will enable us to divide completely the half of the cornea, in traversing the anterior chamber, without giving egress to the aqueous humor while the knife remains in the wound. To effect this object, its blade, being of a triangular form, ten lines in length, at least three lines in breadth near its heel, and slightly convex on both its sides, ought to be somewhat thicker at its back than near its cutting edge, and should gradually increase in thickness from the point to the handle. In this respect, Richter's knife, somewhat shortened as Beer has recommended, appears to me to deserve the preference over all the others. I have had constructed a carp's tongue, four lines broad at its heel, six lines long, terminated by a point somewhat tapered, and which is more convenient for laying open the cornea than the lance of Daviel. An instrument which is longer, of less breadth, and with a point more projecting, has been proposed by M. Furnari for the same object. It is however perfectly understood that we may, if necessary, make use of a simple lancet, the little sickle-shaped knife of Sharp, a very sharp-pointed bistoury, or, in fact, any cutting instrument whatever. The point under these circumstances is, which is the best, and not what is of absolute necessity.

The *second stage* has also attracted much attention from surgeons. The needle of Thuraud, the lancet of Tenon, those of Hellmann and Grandjean, Mursinna's probe, and the kystotome of La Faye himself, with or without the modification of M. Rey or M. Bancal, are generally abandoned. The serpette of Boyer would have also fallen into disuse, if the scoop of Daviel, which Dusaussoy (*Gaz. Salut.* 1786, No. 29, p. 3,) considers that he has improved, and which is still sometimes made use of, was not mounted upon the same handle. Small and straight forceps, having a small hook at their extremity, like those of Reisenger; the erigne forceps of Blaemer, or the tooth forceps of Beer; in fine, an ocular forceps, such as are found at every cutler's; a hook-needle; a small spatula or gold scoop, and Anel's syringe in case of necessity, and which are useful, either for detaching or afterwards removing any fragments of capsule, of membrane or of crystalline; ought also to be placed by the side of the knife on the operating table. In a woman on whom I operated for a *black cataract* at the Hospital of La Pitié, the capsule was so thick and so firm, that it resembled in almost every respect the cornea, causing me a vast deal of trouble to open into and to extract it, for which cases the instruments could not be too sharp. An ossified crystalline, as in the case cited by M. Middlemore, (*Transactions of the Prov. Assoc.*, vol. VI.; *Revue. Méd.* 1838, t. III., p. 269,) would not be more difficult of expulsion than any other. It is probable, however, that if the cornea or vitreous humor were indurated, as in the patients of M. Wardrop and Kulm, the operation for cataract would hardly be thought proper.

*a. Inferior Keratotomy.—I. Ordinary Process.—First Stage.—*

The patient and the assistants being properly arranged, the surgeon depresses the lower lid with the forefinger, which he at the same time presses against the caruncula lachrymalis, in order to support the globe of the eye on the inside; seizes the cataract knife with the other hand; directs its point at a line or half a line in front of the sclerotica, while taking with his little finger a point d'appui on the temple; then plunges the instrument immediately into the anterior chamber perpendicularly to the axis of the cornea, a little above its transverse diameter, and at the side of the outer angle of the eye; immediately inclines backwards the handle of the knife, whose point without this precaution would not fail to wound the iris; then pushes it horizontally with firmness, and without any shaking, to a point diametrically opposite of the cornea, which he again pierces, but from the interior to the exterior; makes it advance upon this line without pressing upon its cutting edge; takes care never to withdraw it towards the outside, and that one of its sides should be exactly parallel to the anterior surface of the iris, while the other looks towards the front part of the eye, until in the progress of its track it has entirely divided the inferior semicircle of the cornea, as near as possible to the sclerotica, that is to say, at a line or half a line from the greater circumference of the iris. It is at the moment when the keratotome terminates this section, that the slightest pressure would be particularly dangerous, and which it is important therefore to avoid, as far as it is in our power to do so. At the same instant, therefore, the assistant is to let go his hold upon the eyelid, which the patient, to whom some few moments are accorded to recover himself from his emotion, gently closes.

*Second stage.*—After having carefully wiped out the vicinity of the orbit, the surgeon raises up the eyelid or causes it to be raised a second time, taking particular care not to touch the globe of the eye; presents with the other hand the back of the kystotome at the most depending point of the wound; penetrates in this manner to above the pupil, whose superior semicircle he passes around by preference from one side to the other, and in such manner as freely to divide the crystalline envelope with the point of the instrument whose concavity is to be turned downwards. When the two eyes are to be operated upon successively, the surgeon rests here for the first, in order not to return to it, until after having opened the cornea and capsule of the second.

*Third stage.*—If the cataract does not of itself pass into the anterior chamber, its expulsion is to be favored by means of gentle pressure properly applied. The operator pushes the left forefinger against the lower part of the eye. With his right hand he places the handle of the keratotome or the back of Daviel's scoop, transversely, upon the upper eyelid, in order to execute while making pressure, slight movements backwards and forwards, upon a level with the ciliary circle, in the direction of a line which would reach from this point to the union of the two anterior thirds with the postero-inferior third of the sclerotica, in passing from above downwards between the crystalline and the vitreous humor. Immediately the lens is seen to pass through the pupil, and to present itself by its border, at the wound of the cornea, which it escapes from, or from which we force it to escape

by gradually directing upon it the pressure from above. We then remove it with the scoop, needle, or point of the knife, when the operation is usually found to be terminated.

*Fourth stage.*—If opaque fragments of the capsule, of such large size as to compromise the success of the operation, should be found to be left behind, they are to be seized hold of and extracted with the forceps. Any other fragment should be removed in the same manner, should the spatula or the scoop prove insufficient. As to those which become arrested in the anterior chamber, unless they should be of a certain volume, it would be much better to abandon them to the dissolving action of the humors, than to irritate by repeated trials with Daviel's scoop, the posterior surface of the cornea. The same remark may be applied to the disfluent layer which is sufficiently often detached from the crystalline, when it escapes into the anterior chamber, and remains adherent to the environs of the wound. Whether the contact of the instrument with the membrane of the aqueous humor inflames this lamella, as Sommer has asserted, or whether it is detrimental in any other way, certain it is, that a manœuvre of this kind is frequently followed by a complete and speedy opacity of the cornea. Warm water injected into the chambers of the eye with Anel's syringe, as Forlenze was in the habit of doing, would evidently be much preferable. As to the dangers of air, which according to M. Maunoir, (*Carron du Villards, Oper. de la Catar.*, p. 156, 216,) gets into the eye in place of the crystalline, making it necessary to fill the anterior chamber with distilled water to drive out this gas, I must differ in opinion from the skilful surgeon of Geneva.

*2. Remarks.*—In place of commencing the *incision* exactly at the extremity, or a little above the *transverse* diameter of the eye, *Wenzel* recommends that the knife should be directed upon the middle of the outer and upper fourth of the cornea, and that it should be made to come out at the same point on its lower and inner fourth. His reason is, that by this mode the root of the nose runs less risk of being wounded, and that the wound being oblique, the eyelids forced in closing to conceal its two extremities, cannot either of them become entangled between its edges. This precept, which is generally recognized in France, is far from having attracted as much attention in other countries. In Germany, for example, it is so little known, that *Weller*, who advises it, appears desirous of appropriating the mode to himself. We should be wrong, perhaps, not to adopt it when the eye is large and projecting, because under such circumstances, the lower palpebral border in fact might have a continual tendency to open the lips of the wound; but in other cases, the advantages which are attributed to it, certainly originate much more from theoretical ideas than from practical facts. The puncture of the inner angle of the eye is a matter of too little consequence to be regarded, and the natural pressure made by the upper eyelid usually suffices to prevent the separation of the edges of the wound, whether it be transverse or oblique. Then again, the projection which usually exists in most persons in the outer orbital process, and that of the superior maxillary bone near the ascending process, cannot but have the effect to impede the march of the instrument, and of in-

curring the risk of making such tractions upon the eye, as to endanger the expulsion of the vitreous humor. Between the two angles of the eye, nothing similar is encountered. When judged necessary, it is generally under such circumstances practicable even to incline the handle of the keratotome towards the temple beyond the transverse axis, without making severe tractions on the eye. In incising at less than half a line from the cornea, it would be with difficulty that we could avoid the iris; at more than a line we should have to apprehend that after the cure, the opacity of the cicatrix would be brought too near the centre of the pupil. A stage which students have most difficulty in comprehending or executing properly, is that which consists in falling perpendicularly on the eye. It is, however, a point of the highest degree of importance. If we approach more to the horizontal line, the point of the instrument, almost always becoming entangled between the laminæ of the cornea, works itself obliquely through them, and sometimes does not reach into the anterior chamber, but at a line and a half from its entrance, making in reality but a small aperture, though in appearance the wound is very large.

To attain the object desired, the surgeon must not lose sight of the position of the eye, and that according as this organ is more or less turned inwards, he must always present the instrument to it from before backwards, and from without inwards, but more or less inclined towards the temple or towards the face. We should also at the same time recollect that the cornea being curved upon a cord shorter than the sclerotica, there must exist in front of the union of these two membranes a slight circular excavation, which causes its perpendicular to be a little less inclined forwards as compared with the diameters of the body of the individual, and the perforation more easy. As soon as the *knife has entered into the anterior chamber*, its cutting edge must be kept downwards as accurately as possible, in order to avoid the ciliary circle and iris behind, or having a cicatrix too near the centre, should it be inclined forward. At the moment when its point is about to emerge at the side of the caruncula lachrymalis, it would, should it not be directed a little towards the anterior plane, bear too much upon the sclerotica, and might again wound the cornea. As soon as we have commenced inserting it, it is important not to give it any retrograde movement until it has completely traversed the eye. The gradual increase of its thickness and breadth, enables it to fill up the wound exactly, from whence it follows that the aqueous humor does not flow out till at the end. However little it may be withdrawn, on the contrary, it leaves necessarily a void from whence this liquid immediately escapes. The iris then protrudes forward, and may be easily wounded. The rule is, that we should detach the half of the circle of the cornea. A smaller wound would render the expulsion of the crystalline difficult, especially should it be of a large size, and would necessitate dangerous pressure. Should the wound be greater, there could be but little inconvenience in it. Were extended it to two-thirds of the cornea; but though in such cases gangrene of the flap, dreaded by Maunoir, can scarcely be apprehended, it is nevertheless unnecessary to go so far. Should it be necessary to enlarge the incision of the cornea, the

instrument in form of a double lithotome, devised by M. Carron du Villards, (Marini, *Bull. de Therap.*, t. VI., p. 282,) might be serviceable, and would readily enable us to attain our object. When the eye obstinately continues at the vault of the orbit, the trefoil of Pamard may be required to render the process of extraction practicable; if it is concealed at the great angle of the eye, we may sometimes bring it out by means of the finger directed upon the caruncula lachrymalis; and better still, with the scoop (*curette d'ecaille*) which I am generally in the habit of using. It could be fixed without difficulty and even without danger, between the middle and forefinger of the assistant and the operator, if we could feel perfectly sure that we could suspend all kind of pressure the moment the knife had penetrated through and through the cornea, that is, a little before the definitive formation of the flap. At least I do not see any risk in proceeding in this manner, until the point of the knife arrives in the great angle. Then we are masters of the organ, and no obstacle prevents our bringing it forward, provided, however, the blade of the instrument is not displaced. In place of the *sound* or flexible probe, which were used by Pellier and Siegerist, we might, when the pulp of the finger did not appear to be capable of effecting our object, use advantageously the nail of the *forefinger*, or even of the little finger, to aid the knife in terminating the flap of the cornea. The extremity of the finger is then directed upon the great angle, in such manner that its pulp falls perpendicularly upon the inner side of the eye, at the same time that its back faces forwards and towards the median line. As soon as the keratotome presents itself, its cutting edge is placed at a right angle on the free border of the nail, as if to support it; after which, while making it pass from the external to the internal angle of the eye, the nail fixes the cornea by making a slight effort, as if for the purpose of gliding outwardly towards the heel of the instrument, until the incision is completed. The shell scoop which I am now in the habit of employing, substituted in place of the nail, renders this stage of the operation still more simple and easy.

In spite of all these precautions the *iris* will sometimes present itself under the cutting edge of the knife. Gentle frictions on the front part of the eye, through the upper lid, often oblige it to withdraw itself backwards, either because we in this manner favor its contractions and its narrowing, or, as appears to me more probable, because the pressure that we must almost necessarily make upon the cornea, restores it to its natural position, by forcing the liquid which is in front of the keratotome from the anterior into the posterior chamber, or perhaps because we straighten its folds by flattening the vitreous membrane. Certain it is that we never succeed better than when we apply the finger naked upon the eyelid, and moderately compress it. After all, the worst that can result from it is a second pupil; which accident has happened to Wenzel, M. Roux, and Forlenze; numerous examples of it are to be found in the works of authors. It has happened many times with myself, and I have not found that the re-establishment of the sight has been thereby interfered with. I am therefore of opinion that it is less dangerous to incur the risk of this accident, than to withdraw the knife to finish the incision with

the scissors, and that prudence, moreover, allows us to dispense with it, if in order to avoid it we expose the eye to fatiguing manipulations. *The elasticity of the sclerotica*, and perhaps also the action of the recti muscles, may quite frequently be found sufficient to expel the crystalline, which then immediately presents itself at the wound, as soon as the instrument is withdrawn, or a short time after. It is indeed owing to this fact that many practitioners have suggested the idea of opening the capsule at first, and not to return to the expulsion of the cataract until after having proceeded in the operation to the same extent upon the other eye. Bell, and after him Jung, from fear of breaking up the crystalline, have proposed to *scrape the capsule* rather than incise it. After having cut through the cornea, M. Jüngken (*Jour. de Kleinert*, Juin, 1836, p. 76,) considers that the chances of success would be augmented by removing the capsule before extracting the crystalline. It is a practice which is decidedly pernicious, and which nothing but the extreme skill of the German oculist has rendered somewhat popular. Pellier, Siegerist, and especially Wenzel, have considered that it would be better to *open* this membrane with the keratotome while *passing through the anterior chamber*, than to return to it afterwards. It was an easy thing for Wenzel, who reached its anterior layer by inclining slightly backward the point of his knife, when it was passing in front of the pupil. For operators who are less experienced, it would be an exhibition of force, and an act of imprudence which might be attended with danger. The operation would be uselessly complicated by raising the flap of the cornea with a spatula, while another instrument was being directed towards the pupil. The cataract knife is rarely employed for this incision, because the iris might thereby be easily wounded. Hey's needle, the little myrtle-leaf of Morenheim, and the spear-shaped instrument of Beer, are special instruments which are replaced by the ordinary curved needle, or the serpette of Boyer, which, however, in consequence of its convex and rounded border, is much better adapted for going through the wound than lacerating the crystalline envelope. I would say the same of the instruments of M. Furnari, which, nevertheless, are constructed with considerable ingenuity. This surgeon after having incised the cornea with his lance-shaped knife, the point of which at the same time lays open the capsule, proceeds to break up the crystalline in its place, by means of a kind of small polypus forceps, which afterwards allows of expelling or extracting it without difficulty through the incision. *The crystalline escapes* readily through a puncture in the centre, or a semilunar incision at the depending point of the capsule, as well as by the numerous incisions vertical and transverse, which Beer was in the habit of making upon it, because it lacerates what makes resistance to it; but the flaps of the opening afterwards approximate, or fall back again into the visual axis, and may, should they become opaque, produce a secondary cataract. On the contrary, by placing the semilunar incision above, as I have recommended, the tearing open of the capsule is made from above downwards, in such manner that the flap which results from it must remain below the pupil. Beer, perceiving that it was sometimes exceedingly difficult to effect this destruction of the capsule conveniently,

decided upon removing it entire, either by means of a hook in cases of silicose cataracts, or by a small forceps, when it is an encysted cataract, or finally, in cases of capsulo-lenticular cataract, by means of his needle-shaped lancet. Richter, maintaining the idea, that, in depression, the capsule and crystalline are always reversed together, (*Bibl. Chir. du Nord*, pp. 269, 271,) asserts that in the operation for extraction also, it is advisable and not difficult to remove them both at the same time. Though Beer asserts that he has often followed this precept with success, he has not found, and will not find in the future but a very small number of partisans. Who, in fact, does not see that the remedy is worse than the evil; that we should succeed much better by making free incisions into the capsule than by detaching it in mass; that by these repeated movements the crystalline will, in most cases, lacerate it, and leave it remaining, so much the more so as the posterior capsular layer is not susceptible of being readily detached from the vitreous humor. It is not often, moreover, that this deep-seated portion of the crystalline envelope becomes opaque. This is fortunate, for unless it was very limited, the evil probably would be without a remedy. Even in such cases I do not know to what extent it would be allowable to follow the advice of Morenheim and Beer, by isolating the opaque point, and attempting its extraction with a hook. I do not think that the laceration of the posterior capsule in many directions, after having extracted the crystalline, as is recommended by M. Landrau, (*Arch. Gén. de Méd.*, t. XIV., p. 113,) would be a prudent course, or present the slightest advantage.

It has been suggested when the cataract was milky to give egress to the altered liquid, or when it was membranous to destroy the capsule only, in order to preserve, according to M. Jüngken, the crystalline in its place with its natural transparency; as if in liquid cataract the whole lenticular apparatus was not at the same time diseased; as if the crystalline could maintain itself with its normal conditions a moment after the capsule had been opened! Diseased or not, it should be removed in every case therefore, should there be no obstacle to our doing so. The *putrid* cataract of Schifferli does in reality exist; an instance of which I saw at La Charité in 1837. The lenticular capsule, which was of a greyish color and very much distended, extended beyond the plane of the pupil in front. The purulent matter which it contained, emitted in coming out an infected odor which surprised all the assistants. In producing a dilatation of the pupil the preparations of belladonna, which were already in use in such cases in the time of Pliny (*Carron du Villards*, t. II.) and Raymar (*Causard, Thèses de Paris*, &c.,) give greater facility to the egress of the vitreous humor, and may in this manner become more or less dangerous. If they are omitted the pupil sometimes remains so contracted as to interfere with the expulsion of the crystalline. In order to obviate these two inconveniences, Bischoff and others have recommended that we should first open the cornea, then the capsule, and afterwards turn the back of the patient to the light when we desire to expel the cataract. By this means the pupil, which was strongly contracted in the beginning of the operation, becomes, they say, dilated of itself, and without any danger towards

the termination. If it were necessary, we might also, say these same practitioners, not make use of any medicated applications until after the eye had been opened into; as if the pupil could then respond to the action of belladonna!

Finally, before proceeding to any active means, we must cause the globe of the eye to be moved upwards, inwards, and outwards, seeing that such movements frequently favor the egress of the opaque body. If from some cause or another the vitreous humor escapes, we must immediately close the eyelids and turn the head of the patient towards his back. This accident, which involves the complete loss of the eye when the hyaloid membrane is entirely emptied, is in the other cases much less dangerous than has been for a long time supposed. It has in fact this thing remarkable about it, that the loss of a certain quantity of the vitreous humor seems rather calculated to augment than to diminish the prospect of a favorable result for the operation. The loss of a fourth part or even a half of this liquid ought not to cause us to despair of success. There is no evidence that it is again produced; but the aqueous humor being more abundantly secreted, takes its place, and the functions of the eye scarcely suffer.

3. *Process of Guérin and Dumont.*—With the view of reducing the operation to its most simple condition, Guérin, and almost at the same time, Dumont, captain of the coast guard in Normandy, each contrived an instrument, the object of which was, by an ingenious mechanism to hold the eyelids apart, steady the globe of the eye, and complete the incision of the cornea by one stroke. The first of these instruments, terminated by a sort of ring bent to a right angle on its handle, concave behind, and shaped to the front of the eye to which it was accurately adapted, includes a cutting blade in form of a fleam, which being put into operation by means of a spring, immediately divides the half of the circle of the cornea either from below upwards or from above downwards. The ring and the handle of the second are upon the same line. Its blade has some analogy to the pharyngotome, and is to be applied horizontally, differing in this respect from the other, which falls on the eye in the manner of the cutting edge of a guillotine. The instrument of Guérin, which was suggested perhaps by the fleam of Van Wy, has been long since abandoned in France, and M. Eckhold, after having modified it, is the only person to my knowledge who has been desirous of its adoption in Germany. Though more convenient and less dangerous, that of Dumont has not met with a better reception.

4. *Guérin of Lyons,* (*Mal. des Yeux*, p. 380, 1769,) uniting the lance of Pamard with the keratotome, was not more fortunate than his namesake of Bordeaux.

If the instruments of which the ancients were so lavish, if every species of brute force has been so carefully rejected from practice in the operations of modern surgeons, with still greater reason ought they to be proscribed on the eye, which is an organ of such delicacy and so easily destroyed. The stroke which is necessarily given to them by letting loose a mechanical spring, the danger of wounding what it is important to avoid, of making an opening either too great or too small, and of cutting sometimes too near and sometimes too far from the sclerotica, are the reasons which have especially intimi-

dated practitioners. It would, however, be unjust to accord no praise to such inventions, and to qualify them as absurd, as some have done, without having it in our power to judge of them with a full knowledge of circumstances. A number of physicians can attest, like M. Hedelhofer, that Petit of Lyons frequently and successfully made trial of the instrument of Dumont. Modified by the nephew of its inventor, it has been said to have obtained sixty-two successful results out of seventy-one operations, if we can receive literally all that has been said of it. What we may affirm is this, that notwithstanding the improvements which have been made upon it by M. Guépin, (*Soc. Méd. de Nantes, 1834, 2d trim., p. 46,*) the instrument of Guérin has been completely proscribed from general practice.

b. *Superior Keratotomy*.—When the lower semicircle of the cornea is opaque or altered in any manner whatever, its section is, in the first place, quite difficult in certain cases. Afterwards the wound is found in unfavorable conditions for cicatrization. This membrane, though sound, may be very small, so that it becomes necessary to detach more than half of it in order to obtain a sufficient opening. In such cases Wenzel advises that we should divide the superior semicircle, and states that he found it to answer perfectly well in the case of the Duke of Belford. Richter is of the same opinion, and B. Bell has formally advised it, even for ordinary cases. According to him there is less danger of the escape of the vitreous body, the cicatrix of the cornea is perfected more rapidly and is less perceptible, and less troublesome to the vision than by the ordinary process. M. Wagner states that M. Alexandre has not hesitated to put the suggestion of Wenzel to a trial, and M. Wilmot, as quoted by M. Eccard, asserts that MM. Lawrence, Green, and Tyrrel have frequently employed it. Dupuytren, in France, also thought proper to make trial of it: but nobody, before the time of M. Jaeger, had gathered a sufficient number of facts upon living man to establish it into a general method. With the upper incision, says M. Jaeger, we have nothing to apprehend from the friction of the palpebral border or of the eyelashes, the tears run more freely and irritate the wound less, which, in its turn, does not so often suppurate, while the prolapsus of the iris must be very rare. A difficulty which first arrested his attention, was the tendency of the eye to turn inwards, or to reverse itself under the upper lid. In this respect he believes that he has removed every objection, by contriving a peculiar keratotome formed of two blades, one of which is a little less than the other, applied face to face in such manner as to represent the knife of Beer or Richter when it is closed. By pressing upon a lateral button the small blade is made to glide upon the large one as in opening a knife with a sheath. The patient and the assistants are to be arranged as in the ordinary method. The operator seizes the double keratotome in the manner of a writing-pen, turns its cutting edge upwards, and passes through the anterior chamber parallel to its transverse axis, while conforming himself in other respects to the precepts laid down above. This being finished he brings back the globe of the eye to its natural position, even depresses it a little if necessary, and fixes it by means of the largest blade of the knife, while the other blade put into operation by the thumb of the same hand, effects the division of the cornea in

gliding from its point to its base. M. Alexandre, (*Wagner, Bull. de Féruſſ., t. X., p. 284,*) who, after having passed through the cornea, leaves a bridle of it which he afterwards divides with a small blunt-pointed knife, appears to have acquired such practice in the use of this instrument, that he can operate alone and without assistants. Since M. Jaeger, in the space of six months, has forty times extracted cataract successfully by means of his double keratotome, it would be incorrect to say that this instrument was positively objectionable. *A priori*, nevertheless, it is difficult to understand its advantages. If it be true that we may firmly fix the eye with its immovable blade, while its other blade is dividing the upper segment of the cornea, it must, on the other hand, pass through the tissues with greater difficulty. Upper keratotomy, moreover, may be very well performed with the ordinary knife. M. Graefe, (*Arch. Gén. de Med., t. XXI., p. 271,*) who has used this successfully in seventeen out of eighteen cases, among others upon the Duke of Cumberland, believes it preferable to the double keratotome, and I have employed no other instrument in the fifteen cases in which I have had recourse to this kind of keratotomy. As to the operation in itself, of all the advantages that are ascribed to it, there are very few that are substantial. It perhaps exposes less to a wound of the iris, to the escape of the vitreous body, and to the separation of the wound by the border of the eyelids; but the manipulation in all its stages is unquestionably more difficult and less secure than in lower keratotomy. How can we afterwards proceed to laying open the capsule, if the eye keeps itself raised up under the vault of the orbit? What means have we of depressing it, if the will of the patient does not effect it? How direct the pressure, if the crystalline delays in coming out? And the attending circumstances of cataract, can it be supposed that it will be always in our power to reach them? It is, therefore, a method of exception and not of choice, applicable only to the cases pointed out by Wenzel, even supposing then that it would not be preferable to recur to the employment of the needle.

III. *Dressing and subsequent treatment.*—Dressing and the subsequent treatment after extraction differ but very little from what has been recommended after depression, only perhaps that it would not be altogether useless, before covering his eyes, to exhibit to the patient some objects that are not shining, to see if he distinguishes them. It is not in order to gratify mere motives of curiosity that this precaution is recommended, but because we are obliged by such a test, when it is not satisfactory, to ascertain again if some opaque substance which it is important to extract, does not remain in the eye. Repose, avoidance of all movements of the eye and the upper portion of the trunk, now become of more absolute necessity than ever. Though the head should be only slightly elevated, I see no reason, however, which should induce us to place it lower than the feet, as was done by Forlenze. The regimen ought to be more rigid, and continued for a longer time, a longer interval also allowed to elapse before the first dressing, and the eye not so soon exposed to the light as after depression.

*The suppuration of the cornea, (la fonte de la cornée,) which we have especially to dread, ought to be watched with extreme atten-*

tion. We can prevent or arrest it only by means of very energetic treatment; bleeding to the amount of from twelve to sixteen ounces morning and evening, leeches to the temples, purgatives internally, and cutaneous revulsives, simultaneously employed the first, second and third day, are not too severe in such cases. It is important even that we should not hesitate, but recur to it immediately as soon as the linen which covers the eye becomes soiled, and as it were saturated with pus, and that the patient complains at the same time of pains in the orbit, before the fourth or fifth day after the operation.

*E. Comparative examination of the processes.* — I. *Depression*, which was alone in use up to the middle of the last century, fell into such discredit, in France at least, after the publication of the labors of Daviel, that in spite of the efforts of Pott to cause its revival, it was scarcely any longer had recourse to by any one at the commencement of the present century. The modifications which it has received from Scarpa rescued it from this oblivion. But the question, which of the two methods is the best? which has so often been debated, and always remained undecided, is still daily revived. In admitting that it is not incapable of solution, it must nevertheless be conceded that the circumstances which enter into its nature are difficult to be appreciated. How can we conclude, for example, because one process possesses a greater number of distinguished partisans than another? because Scarpa, Hey, Dubois, Dupuytren, Richerand, Béclard, Lusardi and Langenbeck, have procured a greater proportion of cures by depression than by extraction; while for Wenzel, Richter, Beer, Demours, Boyer, Roux, Forlenze and Pamard, the case is precisely the reverse? As soon as an operator has made choice of a method which he is in the habit of employing, his predilection always more or less deceives him, and renders him, in most cases, unfit to judge of other methods. Nor are the results, announced by different men equally well instructed, decisive arguments. The successful issues procured by Dupuytren from depression, in no wise prove that this operator would have been less fortunate, if in the beginning he had exerted himself to give popularity to extraction. In promulgating that by means of extraction Sharp had the same number of successes as reverses; that Richter succeeded in 7 times out of 10, Pelletan and Dupuytren 20 out of 50, M. J. Cloquet 28 out of 80, M. Roux 188 out of 306, and A. Pamard 302 out of 359, we prove nothing more, either for or against this method, than do we demonstrate the pre-eminence or inferiority of depression, by saying that in this manner Beer, Weller and M. Roux have failed in more than half their cases, while Dupuytren cites five cures out of six cases, M. J. Cloquet 97 out of 166, M. Bowen 154 out of 160, and M. Lusardi 4168 out of 5034. M. Robertson, (*Presse Méd.*, t. I., p. 430,) having examined 1307 cases of operation by extraction, taken from twelve different authors, has ascertained that 397 of them were failures, while out of 7529 examples of depression, there were but 104 failures. Out of 64 patients that he himself operated upon by extraction, he cured 32; 14 obtained some relief from the operation, while 18 remained uncured. In 115 cases of depression, on the contrary, he procured 94 cures, with 10 cases of amelioration, against

11 failures. M. Serre, (*Bull. de l'Acad.*, t. I., p. 90,) who adopts depression, states that he has succeeded in 62 instances out of 70.

In the table of Brunner (*Anc. Journ. de Méd.*, t. 84, p. 80, and especially p. 86, 1790,) we find 252 extractions, and out of them 149 favorable, 24 mediocre, 61 unfavorable; out of 169 depressions, 134 favorable, 36 unfavorable; out of 100 extractions, 59 favorable, 17 mediocre, and 24 failures; out of 100 depressions, 79 favorable and 21 failures. M. Fabini, (*Bull. de Fér.*, t. XXVII., p. 71,) who in 107 patients, operated 100 times by extraction, states that he obtained 71 cures. In an aggregate of 179 cases of extraction by M. Roux, (Maunoir, *Thèse citée*, p. 78, 79,) there were at one epoch 97 cures and 89 failures. Suppose, in order to show how deceptive this kind of proof is, that the twenty most skilful surgeons of Europe have operated only by extraction, while 20 others taken at random, have always had recourse to depression. Because the practice of the first shall have furnished a larger proportion of cures than that of the second, does it necessarily follow and by that proof alone, that extraction is preferable to depression?

II. Let us see whether, after having passed in review the principal advantages and inconveniences of both methods, we may not arrive at something more satisfactory.

*Extraction* enables us to remove with certainty and without a return of the disease, the impediment to vision. Besides being attended with but little pain and rarely followed by an internal inflammation, it incurs the risk of wounding neither the ciliary nerves or vessels, leaves intact the whole interior of the eye, the retina, choroid, ciliary circle, &c., but in performing it, we may wound and deform the pupil, and cause the escape of vitreous humor; if the wound which it produces does not cicatrize by first intention, it ulcerates, soon brings about a prolapsus of the iris, and sometimes an atrophy of the globe of the eye, or at least a very extensive opacity of the cornea; the subsequent symptoms also are tedious; it rarely happens that the ophthalmia which accompanies it, terminates before the fifteenth or twentieth day; finally, it cannot be employed in all persons nor at all ages. M. Roux, (Maunoir, *Thèse citée*, p. 81,) who operated upon 43 cases in the spring of 1833, had the misfortune to lose three of them. In 35 patients operated upon in 1836, by the same practitioner, (*France Méd.*, t. I., p. 50,) the escape of the vitreous humor took place in five; the iris was wounded several times; and a violent inflammation of the eye occurred in eleven cases. Thirteen patients recovered their vision perfectly. The result was incomplete in eight others; in fourteen cases the operation did not succeed. One of the patients operated upon, died of erysipelas. In 179 patients operated upon by M. Roux at another epoch, (Maunoir, *Thèse citée*, p. 79, 80,) suppuration of the eye took place in 14 cases, opacity of the cornea in 28, and a false cataract occurred in 22. It would appear, however, according to M. Maunoir, (*Thèse citée*, p. 49,) that at La Charité, during the time of M. Roux, membranous cataract was ascertained to have occurred but in 5 instance out of the above mentioned 179 cases.

*Depression* confines itself to displacing the opaque body, and abandons it in the depth of the organ, leaves there, consequently, a

permanent cause of irritation in the eye, incurs the risk of the reascension of the crystalline, and is frequently followed by secondary membranous cataract, iritis, deep-seated pains and general nervous symptoms. The needle penetrates through delicate tissues, necessarily wounds the choroid, the retina and the vitreous humor, and sometimes also the iris and ciliary body. But on the other hand, it does not give rise to the escape of the vitreous humor, nor does it expose to spots, or ulceration of the transparent cornea, or prolapsus or excision of the iris, nor to the immediate destruction of the eye. On the following day the puncture which it makes is closed, and the conjunctiva, which in a majority of cases is but slightly inflamed, ordinarily resumes its natural appearance at the expiration of from eight to twelve days. Finally, we may if necessary apply it to all cases, and repeat it one or several times upon the same organ, without incurring the risk of any great danger to the patient.

III. After this enumeration it would appear at first view, that depression ought to have the preference over extraction. A rigid examination, however, does not permit us to come to a conclusion so clear and positive. It is true that the puncture of the sclerotica, choroid, retina and vitreous body, rarely produces more pain than the section of the cornea, when we proceed in the manner I have pointed out. The wounding of the nerves, and vessels of the ciliary body, is easy to be avoided, and generally attended with no unpleasant circumstances. When the crystalline capsule is properly lacerated, we cannot see why secondary cataract should be more common after depression than after extraction. If the crystalline is securely fixed in the vitreous humor, it is difficult for it to reascend or for its presence to disturb the retina. With skill also we may succeed in avoiding the iris, which the needle moreover never wounds as seriously as the keratotome. But we should be wrong in maintaining that this method is more simple and more easy than the other. It is not so easy as some persons imagine to pass the instrument between the uvea and the cataract; not to get it entangled between the crystalline and its envelope; to make the proper opening into the capsule; or to hinder the opaque body from being reversed, either upwards or downwards, should the concavity of the needle press it ever so little more in one direction than another, or be deviated from the direction indicated, or that the lens shall have contracted adhesion with the surrounding parts; finally, it is not until after prolonged trials that we are enabled to detach it and fix it at the bottom of the eye. The greatest degree of address, therefore, is indispensable to perform depression in such manner that it may have every possible chance of success. If inexpert surgeons generally prefer it, it is less owing to its apparent simplicity, than because it does not allow their mistakes to be so clearly noticed as the method by extraction. On the other hand, the irritation which it produces augments the secretion of the humors, and soon creates in the eye a feeling of distension which does not take place in the other method. A chronic or acute iritis, and afterwards a contraction and even a complete obliteration of the pupil, may frequently be produced by it. The lesion of the vitreous humor, without being immediately dangerous, may not however be altogether free from inconveniences.

The crystalline, which in fact disappears sometimes by absorption or dissolution, still more frequently remains with all its usual form and size during the space of years, and even during the whole life, whatever the moderns may have said of it to the contrary, on the authority of Pott, Scarpa, and Dablin, (*Biblioth de Planque*, t. III., p. 341, in 4to.) who, in the year 1722, had ascertained its absorption, and concluded that this always took place after depression. Beer has seen it reascend at the expiration of 26 years. Out of twelve patients whose eyes I have had it in my power to examine after death in the different hospitals, at one year, two years, two years and a half, and four years after the operation, it had scarcely diminished a fifth of its size in the only subject in whom it was perceptibly altered. In the others it had ultimately, by means of some lamellæ of the hyaloid tunic which separated that coat from it, contracted adhesions with points of the retina and choroid, which themselves exhibited a sort of knot or cicatrix of about three lines long. M. Campaignac, who has made special researches upon this point of practice, also asserts that after depression the crystalline lens is far from disappearing as speedily, and especially as constantly as had been supposed. This therefore, it must be allowed, is a serious inconvenience, one which no argument can extenuate, and which will always render the operation for cataract by depression less *complete* than by extraction.

IV. *Keratonyxis*, which Dr. Wedemeyer rejects after having made trial of it in fifty-three instances, would succeed no better, and whatever M. Schindler, who defends it, may say of it, it would be an objectionable mode of giving confidence to practitioners by penetrating after the manner of this author, through the centre of the cornea, instead of passing through the depending point of the anterior chamber. The crystalline, after it has escaped or been abandoned in front of the iris, whether in mass or in fragments, is far from being dissolved there as speedily as some authors assert. Observations collected by M. Plichon at the Salpêtrière, prove that it then often forms there a foreign body, and that if we do not hasten to remove it the eye is exposed to serious dangers. Another defect still more grave is the following: the pupil may remain movable and perfectly uniform, the whole organ have an appearance of the most perfect integrity, but the vision nevertheless be totally destroyed. I have seen four persons at the central bureau, who were blind from this cause, and who had been operated upon at Paris. A man sixty-two years of age, whom I had operated upon in 1829, at the hospital of St. Antoine, came to consult me in 1831. At first view one would say that his sight was perfectly free. The pupil is of a beautiful black, round, regular, movable, nor abnormally contracted or dilated, yet nevertheless the blindness is complete. What has imposed upon the partisans of depression is this, that the patients quite frequently appear to recover their sight after the expiration of a certain time, and preserve it, in fact, during the space of one or two months, but afterwards find that it gradually becomes enfeebled, and that the vision is totally destroyed in less than a year. If the operation, repeated seven times in one case, six times in another, and in a third as often as thirteen times on each eye, enabled Hey to cure his pa-

tients, it is nevertheless true that these repeated attempts prove unsuccessful in a majority of cases. The truth is, however, that their consequences are generally not very serious. After depression, particles more or less opaque almost always remain or are formed in front of the vitreous body. Experience proves that after extraction this accident is infinitely more rare. As to this last method it is evident, that the section of the cornea is much more delicate than the perforation of the sclerotica; that in spite of every precaution the vitreous body may escape, and the iris be extensively divided by the knife, or separated or torn by the crystalline; but after all, if the operation is well performed and the patient in a favorable condition, three accidents, the escape of the vitreous body, the suppuration of the eye, and the consecutive opacity of the cornea, can alone render it dangerous; while all other things being equal, it procures without question a result either immediate or definitive more satisfactory than the method by depression. It is requisite to state, however, that the escape of the crystalline again exposes to two other accidents. Though largely dilated by the action of belladonna, the pupil almost constantly contracts so much as to oppose a certain degree of resistance to the opaque body, which then has a tendency to detach the iris from below, in such manner as to make its escape there if the pressure upon the eye has not been made with an extreme degree of caution. This pressure in its turn, if made quickly upon the cornea in consequence of some unexpected movement of the patient at the moment when the border of the cataract presents itself at the wound, may thrust back the lens above the vitreous body; in such manner that we may remain in doubt whether it is still in the eye, or if it has actually escaped, as has happened to me in one instance.

V. *The prolapsus of the iris*, which often occurs after the operation, and more frequently in old men, in consequence of the cornea in them being tardy in cicatrizing, is treated by mechanical means or belladonna, so long as there is no adhesion; in the contrary case, by nitrate of silver; and is not more difficult of cure here than under any other circumstances. When our object is to leave no obstructing particle in the eye, there is no objection to throwing up through the wound one or two injections of tepid water with a small Anel's syringe. Perhaps even it would be really advantageous to imitate Forlenze and to adopt this method generally. Finally, if the dangers of extraction are more serious and more apparent, those of depression are more numerous and more real. Operators alike skillful will more easily avoid the first than the second, and if the employment of the needle less frequently fails of procuring some relief to the patient, the method of Daviel furnishes by compensation a greater amount of radical cures. Find a way to avoid the suppuration of the cornea, and extraction will obtain a large amount of cures; prevent iritis after depression, and the patients, though free from suffering or danger, will nevertheless run the risk of obtaining but imperfect results from the operation. Out of 300 operations for cataract whose cases I have minuted, I count 200 cures. In the hospitals where I have adopted sometimes extraction above or below, sometimes depression by different methods, I am still uncertain to which method I ought to attribute the greatest amount of advantages or inconveni-

ences. In private practice, extraction evidently succeeds better. I conclude therefore that under circumstances where the two methods might either of them be indifferently made trial of, extraction is preferable; but that in other cases, it is sometimes one and sometimes the other which should be adopted. Depression, for example, appears to be preferable in children and intractable subjects; or when the eyes are small and sunk deep in their sockets, when the cornea has spots upon it and is small and flattened, when the eyelids or conjunctiva have been for a long time diseased, when we have reason to fear an acute inflammation of the connecting tissues of the eye, when the cataract is perfectly liquid, when the pupil is contracted or the iris adherent to the cornea, and when the eye has great prominence and is very irritable. Extraction, on the contrary, presents more advantages in old men and even in adults, if the anterior chamber is large, the crystalline very hard, the cataract membranous or adherent, and the eye perfectly sound, possessing little sensibility, and admitting the keratotome to penetrate through it without difficulty.

[*Ossified Crystalline Lens.*—The *crystalline lens* having become opaque from a blow in a man aged 44, (see Mr. France in Guy's *Hospital Reports*, Oct., 1845,) was afterwards extracted and found to consist chiefly of carbonate and phosphate of lime. T.]

#### [CATARACT.

Dr. Dubois, of Neuchatel, in Switzerland, (*Gaz. Méd. de Paris*, Nov. 8, 1845, t. XIII., p. 721) removed in July, 1841, by depression, a cataract which was situated in the right eye of a woman aged 49, accompanied with a slight albugo in the cornea, both of which had existed for the space of 40 years. She was induced to undergo the operation from a cataract having commenced to form also on the left eye, in 1841, which when ripe the succeeding year was also removed. This left eye being, from its long use, fully developed, could now see better than the other, where a contrary state of things existed, with the addition of the partial opacity of the cornea, which still presented some obstruction to vision. Doctor Tavignot remarks (*Ib., loc. cit.*, p. 720) that disuse of the eye for a long period undoubtedly arrests its development, and that on this account persons a long time confined in dark places (as in dungeons) lose the sensibility of the retina, and thus become liable to amblyopia, or even to amaurosis. But the condition of the eye, where a cataract complete has existed in both organs for a great number of years, is not precisely, or at least is only partially analogous to that which takes place from the total exclusion of light from *sound* eyes. In old cataracts, the retina still retains its sensibility to a certain extent, and receives a certain portion of the rays of light transmitted through the opaque lens. Hence the important deduction that such cataracts, however ancient, as recent facts have proved, are not beyond the hope of surgical relief. Dr. Tanchou alludes to the remarkable case of a man aged 67, in whom M. Serre, of Montpellier, operated with entire success in 1844, for a cataract which had existed in the left eye for *sixty years*. (*Gaz. Méd. de Paris*, t. XIII., 1845, October 25, No. 43, pp. 677, 678.) The occasion which led to the operation was a traumatic cataract, which suddenly formed in the *right* eye,

accompanied with protrusion of the iris through the cornea. On examining the left eye, he found there a lenticular cataract, with a slight albugo in the cornea. Deeming this the most secure, he hazarded the operation in this eye, when the sight was restored perfectly. Dr. Tavignot furnishes a number of examples of the cure of old cataracts, single or double, congenital or otherwise, and which had existed for various periods from 12 to 20, 26, 30, and even 45 years. Dr. Alexander Watson, of Edinburgh, (*Ed. Med. and Surg. Journ.*, Jan. 1, 1846, p. 57, &c.,) considers that the process of breaking up *soft* cataracts, in order to promote their solution and absorption, as now practised and in vogue, is so eminently successful, that it promises to be substituted altogether for depression or extraction in this form of the disease. For hard cataracts, and where depression or displacement is decided upon, he recommends a process somewhat new, and the intention of which is to avoid any injury to the hyaloid membrane and iris, and to prevent the reascending of the lens. As the important point is to disengage the lens from its capsule before depressing it, this is to be effected by lodging it in a breach to be first made with the needle in the vitreous humor, after which the posterior part of the capsule opposite this breach is to be carefully opened by an incision, and the lens also pushed through it into the humor by means of the same needle. Dr. Watson penetrates the coats of the eye at a line and a half posterior to the margin of the cornea, with the small cataract bistoury. This brings him readily upon the part of the vitreous humor designated. After making a suitable breach there, the needle incises the posterior portion of the capsule transversely from the nasal side outwards. The point of the needle is then applied flatwise on the anterior part of the capsule, between it and the iris, so as to make pressure upon the lens upwards and backwards, in order that the lower margin of the lens may pass backwards through the opening in the posterior portion of the capsule; after which, by shifting the point of the needle forwards upon the lens, the latter is pushed backwards and downwards into the breach of the vitreous humor, from whence, he says, *it never rises*. If the capsule remains entire, it is an advantage, as the humors in the different chambers of the eye are thus prevented from incorporating, which lessens the risk of subsequent inflammation, and if it should afterwards become opaque, it can easily be removed by a subsequent operation. Address is required for this operation, as the capsule is usually transparent. This process answers also for re-clination. If the lens should unexpectedly be found to be soft, it can be broken to pieces, and these fragments, or some of them, pushed into the breach of the vitreous humor, where they will dissolve. The breaking up of an *opaque lens*, that it may dissolve in the aqueous humor, and performed in such manner as not to wound the hyaloid, is a process well suited to young subjects, whether the cataract be spontaneous or from an injury. For keeping the eyelids open, Dr. Watson finds a plain, broad, flat, smooth ivory hook, the end of which is curved short, so as to be parallel with the shaft, better than metallic instruments. T.]

F. *Artificial Cataracts.*—For a long time it has been thought necessary to produce cataracts artificially, and to exercise ourselves

beforehand upon animals or dead bodies, and to give moreover to the eye all that mobility which renders it so difficult to steady it at the moment of the operation. Troja in Italy, and M. Bretonneau in France, have made trial of some experiments in order to render the crystalline opaque, by means of diluted acids. M. Leroy, (D'Etiolles,) has supposed that this could be effected better by means of electric discharges, but nobody before the time of M. Neuner of Darmstadt, (Maunoir, *Thèse citée*, p. 43,) had made this point a subject of particular attention. The liquid which he made use of with most success, was a solution of six grains of corrosive sublimate in one gros of pure alcohol. A small glass syringe, garnished with platina and terminated by a very fine syphon, and which is traversed by an extremely sharp probe, in such manner as to be enabled to pass beyond its two extremities, is first filled with this solution. It is then passed through an opening previously made at the outer angle of the eye, from above downwards, from without inwards, and from behind forwards, until it reaches the posterior surface of the crystalline, into which the point of the probe, which serves as a conductor to the syphon of the syringe, is plunged, after having perforated its capsule. The small probe being then no longer necessary, is withdrawn, and the thumb, resting upon the extremity of the piston, gently forces the liquid into the substance of the lenticular body, which soon changes its color. The same process is performed, if necessary, on the inner angle of the eye, when the operation is terminated. Among the contrivances devised for representing upon the eyes of the dead subject, the principal difficulties which are encountered upon living man, the ophthalmo-phantome of M. Sachs, is certainly the most ingenious; composed of a socle mask, and eye-supporter (*porte-œil*), the description of which I cannot give in this place, it appears to me, however, to be too complicated ever to be received into general use. I have no necessity in saying, that one of the middle refractors of the eye being now removed or displaced, almost every individual who has been operated upon for cataract, ought to wear spectacles with convex glasses, like long-sighted persons. Upon this subject, moreover, Maitrejan had established upon the dead body, what M. Roux and others have since announced—to wit, that after the extraction of the crystalline, the vitreous body becomes more convex in front, as if for the purpose of filling up the void, which after the operation has been left in the eye, and to render spectacles less necessary. In children, and in persons blind from birth, in all those in fine who for the first time are obliged to subject their sight to a course of discipline, it is well to add to the precautions which are generally used, a very simple means successfully employed by Dupuytren, and which consists in fixing the hands behind the back, in order that being deprived of the use of these members, they may be compelled to make greater efforts with their eyes to direct them upon external objects.

#### § IV.—*Artificial Pupil.*

Two very distinct conditions of things may require the formation of an artificial pupil; the opacity of the cornea, and the contractions or obliteration of the natural pupil. In the first case, whether

the impediment to vision be the result of a simple ophthalmia, an ulcer, or a wound, or any other lesion of the cornea, is a matter of little importance. Provided the interior of the eye is not affected, and that a transparent point remains outside, the operation for artificial pupil may be undertaken. In the second case, whether there be myosis or ptosis, synezizis or atresia; whether the pupil is completely closed or merely contracted; whether the alteration be congenital or accidental, the effect of an internal ophthalmia, of an iritis, or of the operation for cataract, by depression, or extraction; whether the iris preserves its form or not, adheres, or is not adherent to the cornea or the capsule of the crystalline; or whether there may or may not be senechia, whether anterior or posterior, the operation is equally practicable, (though it offers infinitely less chances of success,) so long as the retina has not lost the faculty of perceiving the rays of light, and that the anterior chamber retains its transparency. If this last condition is wanting, it will be in vain that we make a new pupil, and that the light arrives at the bottom of the eye. Acute or chronic inflammations of the internal tunics, the progress of which has not been definitively arrested, also constitute counter-indications, which, though less absolute, are nevertheless sufficient with a few exceptions to restrain a prudent surgeon. Almost all authors prohibit, moreover, the making of an artificial pupil, so long as there is but one eye only diseased, and that the patient sees sufficiently well to get along without a guide. The operation, in fact, being sometimes followed by accidents, which may in themselves produce serious injury to the vision, it would not appear to be prudent to expose the patient to lose the little that remains to him, when, moreover, in the attempt to ameliorate his condition, the chances of success are sufficiently precarious.

A. *Operative methods.*—All the processes recommended for forming a new pupil may be resolved into three methods. In one, *iridotomy* or *coretomy*, we incise the iris only; in the second, *iridectomy* or *corectomy*, we excise a flap from this membrane; while in the third, *iridodialysis* or *coreodialysis*, we confine ourselves to detaching its circumference at one of its points.

1. *Coretomy or method by incision.*—Before the time of Cheselden, no one spoke of iridotomy; since then it has attracted the attention of Mauchart, Sharp, Sprægel, Meiners and Rathleaw, who have proposed it in cases of persistence of the pupillary membrane; and of Odhélius, Guérin, Janin, Wenzel, and MM. Maunoir, Adams, &c., who have subjected it to various modifications. The patient, operator, and assistants, are to be placed in the same manner as in the operation for cataract.

a. *Process of Cheselden.*—By means of a small knife of the shape of a scalpel, with one cutting edge only, Cheselden penetrated in the same manner as is done for depression through the sclerotica as far the uvea. Having arrived there, he caused the point of his instrument to pass into the anterior chamber. Afterwards directing it from without inwards, and from before backwards, according to some, or on the contrary, according to others, from the internal to the external angle, and from behind forwards, he made at the centre of the iris a transverse incision of from two to three lines in length. A

pupil of an elliptical form, similar to that of certain quadrupeds, was the result of this delicate operation, which was attended with entire success, and vividly attracted the attention of the learned world.

*b. Process of Sharp.*—Sharp in performing coreotomy, professes nothing else than to have imitated Cheselden. A small scalpel, slightly convex on its back, a figure of which he gives, is first directed horizontally, its cutting edge turned backwards, into the posterior chamber, between the circle and root of the ciliary processes. Nothing then remains but to incline its point forward, and to push it a little in order to penetrate into the anterior chamber. We have now to incise the iris transversely, either upon a line with or below, or what is better, above the natural pupil. The opening made by this operation, which continued for some time, was not long in contracting, and ultimately closed up completely. Sharp thus appears to accord very little confidence to the method of Cheselden.

*c. Mauchart* has no other claim to be mentioned in this place, except because he appears to have been the first to have advanced the idea of perforating through the cornea in order to form the pupil. He moreover cautions us against giving too great an extent to the artificial opening, and remarks that this kind of pupil is not capable either of spontaneous dilatation or contraction like the natural one. *Henkel* also recommends that we should go through the anterior chamber. *Heuermann*, who is of the same opinion, recommends for the incision of the iris and cornea, that we should use the ordinary lancet in place of the needles, or knife of Cheselden.

*d. Process of Odhélius.*—Odhélius, in a patient with an opaque cornea, after having incised the cornea in the same way as for extraction in cataract, divided the iris from its centre to the circumference, on a line with the pupil, which in other respects was very much contracted. By this means he obtained a triangular opening continuous in its base with the remains of the primitive pupil, and which enabled the vision to be completely re-established.

*e. Process of Janin.*—Janin, having frequently made trial of the method of Cheselden without success, supposed that we would succeed better by giving a vertical direction to the wound. The transverse incision, he remarks, closes speedily and almost of necessity, because the radiating fibres of the membrane are separated only; while they are actually *divided* by means of the perpendicular incision, made a little within the natural pupil. It was an accident which led him to make this modification. It happened to him as it would to any person, that he divided the iris in performing the operation for cataract by extraction, and that he thus made, against his will, an artificial pupil on the side of the natural one. Perceiving that this opening, which he did not intend to make, did not close up, while those which he had effected designedly always became obliterated, he proposed to take advantage of this, and directed his attention afterwards to systematizing the process which chance had pointed out to him. Kortum proposes that in place of the scissors, we should incise the iris vertically with the keratotome. But, notwithstanding the experience of Weissemborn, and the observations of Pellier, which are calculated to corroborate its advantages, the process of Janin was soon abandoned. It was soon evident that the

pupil made in this manner, does not endure any longer than, and closes and disappears fully as much as it does by the transverse method.

*f. Process of Guérin.*—With the view of uniting their advantages, Guérin proposed to combine the processes of Cheselden and Janin, and to employ them together, that is to say, to make a crucial incision in place of a simple vertical or transverse slit. But while on the one hand the operation is thus rendered much more difficult, on the other, it is not uncommon to see the four flaps approximate so much at their apex as to prevent the light from arriving at the bottom of the eye; so that this recommendation has been rarely adopted in practice.

*g. When the vision is impeded by a leucoma,* Pellier confines himself to enlarging the natural pupil, in place of making one complete in itself. For that purpose he incises the cornea in the same way as for extracting the crystalline; introduces a small canulated sound into the posterior chamber of the eye; uses this as a guide to the point of a small pair of scissors, and first divides the iris outwardly, then inwardly and upwards, from the pupil to the ciliary ligament.

*h. Process of Maunoir.*—The process by M. Maunoir, though the result of researches made by this author, nevertheless appears to be only an improvement of that of Pellier. This surgeon, by means of a keratotome or lancet, makes an opening of two or three lines in extent at the outer and lower part of the cornea; introducing through this a small pair of scissors bent at an angle on the border near their heel, and one of the blades of which terminates in a button, he opens them in the anterior chamber; then plunges one branch through the iris into the posterior chamber, in such manner that the other which bears the button remains behind the cornea; incises the membrane thus included inwards, then outwards and upwards, and forms at its expense a triangular flap whose adherent base faces the circumference of the eye. The *needle-shaped scissors*, devised by M. Montain, with the view of avoiding the previous section of the cornea, though ingenious, do not however present an improvement of sufficient importance ever to obtain the preference claimed for them by their inventor. By this double incision the circular fibres that M. Maunoir supposes to exist in the iris are divided twice, while the radiating fibres remain intact; from whence it happens that these latter by their contraction constantly tend to dilate the new pupil, in place of favoring its contraction, as in the method of Cheselden.

*i. The ideas of the surgeon of Geneva,* which he has frequently, and again in 1837 (*Bibl. Universelle de Gêneve*, Avril, 1838) practised upon with success, have received the sanction of the celebrated *Scarpa*, who, in order to sustain them, was eager to renounce his own method. They have also met with partisans in Germany. But in England and France they have not generally been made trial of. Moreover, it is evident that if we were desirous of performing coreotomy upon this principle, of which M. Carron avows himself the champion, it could be advantageously modified by making use, as I have often done, of the ordinary keratotome, or the movable cutting needle, which I contrived for form-

ing the triangular flap of the iris, thus doing designedly what we often do in spite of ourselves when we perform the operation for cataract by extraction; this is the process which Daviel, Hoin and Wenzel appear to have recommended for adoption, and which Odhélius has also sanctioned.

*j. Process of M. Adams.*—M. W. Adams has gone back to the process of Cheselden, with this difference, that in place of a straight knife like that of Sharp, he employs a small scalpel convex upon its cutting edge, breaks up the crystalline when he considers it opaque, and endeavors, what is sufficiently singular, before quitting the eye, to entangle some fragments of it in the transverse incision of the iris to prevent its closing up. M. Roux frequently made use of this process while I served him as assistant, and in every case the new pupil ultimately disappeared. Nor does it appear, moreover, to have received much respect in the country of its author, for it is rare that it has been had recourse to there by other surgeons. Nor have I myself been more fortunate with it in the two trials that I have made of it.

*k. Coreotomy*, still further modified by Jurin, MM. Langenbeck, Weller, Faure, and by *Wardrop*, who by means of a needle passed into the posterior chamber, perforated the iris a first time from behind forwards in order to enter into the anterior chamber; then a second time from before backwards, and nearer to the inner angle of the eye in order to return into the posterior chamber; and who afterwards united together by means of one of the cutting edges, rather than by the point of his instrument, the two small wounds, by detaching one of the extremities of the flaps which they circumscribed, and all this with entire success, in a lady 46 years of age, blind from her birth, has found in these latter years numerous antagonists among the oculists of Germany.

*l. Process of the Author.*—I make use of a knife somewhat longer and of less breadth than that of Wenzel, cutting on its two edges to the extent of four lines from its point, and afterwards blunt or rounded upon the back as far as the handle, an instrument in fact of which the *serpent-tongued* lancet may convey a tolerable idea. Held as a writing pen, it is plunged through the cornea on its temporal side, and a little obliquely from before backwards. When it has arrived in the anterior chamber, its point is guided with precaution into the posterior chamber, dividing the iris as it proceeds, and then brought back after making a track of two or three lines, into the anterior chamber through the same membrane. In continuing to advance it forward, up to the point of piercing the cornea a second time, it becomes easy to divide the species of bridge which covers its anterior surface, and not to detach completely one of the extremities of this flap of the iris, until after having transformed the other into a pedicle as narrow as may be desired. We thus procure a division which amounts to a loss of substance. The fragment of membrane which has been cut out cannot be long in rolling up upon itself, and must ultimately become dissolved in the aqueous humor. It is even possible in most cases to excise it entire, when the manipulation which I have just pointed out has been properly executed. In fact if the instrument acts in an equal manner on the two ad-

herent points of the bandelette to be divided, up to the moment when the section of one is completed, all that will be required to detach the other and to transform coretomy into corectomy, will be to advance the keratotome a little farther, and to incline its cutting edge correspondingly towards the cornea. My *keratonyx* attains this object still better.

II. *Coredialysis or Method by Décollement*.—To Scarpa we are indebted for having systematized *décollement* into a method; many authors, however, had mentioned it before him. Sharp for example, in speaking of coretomy, makes the remark that the iris very frequently detaches itself when pressed upon by the instrument in place of being divided. In a patient operated upon for cataract by Wenzel, the crystalline escaped in this manner through an accidental opening. The natural pupil afterwards almost entirely disappeared, but the patient continued to see by the abnormal opening. If we may believe Assalini, Buzzi de Milan, who performed coredialysis in 1788, plunged a spear-shaped needle through the posterior chamber into the body of the iris, at a line distant from the obliterated pupil, and by well directed tractions detached this membrane from the ciliary circle. A. Schmidt, who on his part published a good memoir on this subject in 1803, states that he had recourse to this operation in 1802, and had conceived the first idea of it in 1792.

a. *Process of Scarpa*.—Scarpa, when his needle has reached into the interior of the eye, as in the operation for cataract by depression, turns its concavity forwards; directs it behind the upper and inner portion of the uvea; pushes its point through the iris into the anterior chamber; and uses it afterwards as a hook in oscillating it from above downwards, from behind forwards, and from within outwards, in order to detach the great circumference of this membrane to the extent of three or four lines, in such manner in fact as to procure an opening a slight degree larger than the natural pupil.

b. *Process of T. Couléon*.—Toché-Couléon, one of the first, Flajani, Himly, Beer especially, and Buchorn, proposed that the needle, whether straight or curved, should be directed in some way or another through the cornea, and not through the sclerotica. According to them, it becomes full as easy in this manner to place the new pupil upon the out as upon the inside; moreover, we see better what we are doing, and the puncture of the eye must be less dangerous.

c. *Process of Assalini*.—Assalini, after having made an incision at the outer angle of the cornea, introduces into the anterior chamber a pair of fine curved forceps, soon after opens them, seizes the iris at a short distance from its ciliary border, and detaches it as in the process of Scarpa. These forceps are considered useless by Bonzel, who substitutes for them a very small hook, which is conducted in the same manner. Dzondi makes use of a description of forceps, the inner side of one of whose branches is to be grooved in order to receive the other when the instrument is closed. He pretends that with this forceps we run no risk of lacerating the iris, and that by it it is more easy to effect *décollement* than with any other instrument. The strongest and best founded objection to be made against coredialysis is, that the detached border of the iris gradually reassumes its natural posi-

tion, and that, at the expiration of a certain time, the new pupil almost always closes.

*d. Process of M. Langenbeck.*—To obviate this inconvenience, M. Langenbeck, after having seized hold of the iris by means of a small hook protected in a sheath, draws it forwards and insinuates it into the wound of the cornea, which should be very small, and then attaches it there as if for the purpose of producing a *myocephalon*. The adhesions which this species of hernia soon contract prevent the pupil which has been formed from narrowing, and give to the operation all the certainty desirable.

*e. Reisenger*, who advances the same idea, censures the sheath-hook of Langenbeck, and makes use of a simple eye-forceps, the point of which is curved like an erigne on one of its sides. This forceps is introduced flatwise, and shut to the farthest limits of the anterior chamber. Its concavity is then turned backwards. It is opened the space of one or two lines, to be closed again after having plunged it through the iris, which membrane is thus found pinched or hooked up, and is then detached and drawn to the outside in order to produce an artificial prolapsus through the cornea. The *coreonction*, so much extolled by M. Graefe, is used in the same manner as the sheath-hook of M. Langenbeck, and differs from it scarcely except in the little keratotome which it has on one of its extremities.

*f. Process of M. Lusardi.*—M. Lusardi has proposed to reduce coré dialysis to its greatest degree of simplicity, by devising a hook-shaped needle which alone would answer for the whole operation. When closed, this instrument has the form of a Scarpa needle, or rather of a very small serpette. The two stems which compose it are arranged in such manner that, by drawing a little upon the shortest or that which corresponds to its convexity, there immediately results from it a notch which transforms it into an actual forceps. It is introduced through the cornea in the same way as in keratonyxis, in order to pass it through the anterior chamber, if that is free, or in the opposite case through the posterior chamber, after having cut through the iris up to the ciliary circle. Having arrived there, the surgeon presses its back against the great border of the ocular diaphragm, which he endeavors to detach by means of an oscillatory movement, then opens his needle, and afterwards loosens its spring, by which means the membrane is thus found embraced. Nothing remains but to bring it to the opening of the cornea, with the precautions required for giving to the new pupil the necessary dimensions.

*g.* With this instrument, already described in Italy by Donegana and Baratta about twenty years since, M. Lusardi thinks we run no risk of wounding the capsule of the crystalline, which is not demonstrated, and that we may be enabled to establish an artificial pupil upon any point whatever of the ciliary circumference, which is more correct; but the ordinary needle presents nearly the same advantages. I do not speak here of the process of Assalini, which, in order to remove the new pupil as far as possible from the crystalline, proposes that in coré dialysis we should destroy a portion of the ciliary circle and processes, at the same time that we detach the great circle of the iris.

This method clashes so much with the object which the practitioner has in view, that no surgeon has ever yet had recourse to it.

*h. The process of Donegana* is not obnoxious to the same objection. Perceiving that the pupil, after coredialysis by the method of Scarpa, almost always finished by closing up, this oculist has proposed, in order to prevent such an inconvenience, that we should unite the method by incision to the method by décollement. He therefore, after having detached the iris from the sclerotica, divides it to the extent of one to two lines, in a direction parallel to its radiating fibres, and from its greater to its smaller circumference. For that purpose we may penetrate through the posterior or anterior chamber, and make use of the ordinary needle, or of an instrument with a blade which is somewhat more slender, almost straight, and very keen. Unfortunately it is not so easy as might be imagined to incise the iris after having detached it in the interior of the eye. Unless we make use of the keratonyx, it folds itself up under the knife, and tears or separates itself from the surrounding parts, much sooner than it is divided. Nevertheless it is an improvement which may have some advantages, and which it would be advisable to make trial of when we perform coredialysis according to the method of Scarpa.

*III. Corectomy, or the method by Excision.—a. Wenzel* appears to be the inventor of corectomy. Nevertheless it cannot be denied that before him it was put in practice by Guérin, who, as Sprengel remarks, sometimes excised the point of the flaps of his crucial incision. Sabatier, who adopts the process of Wenzel, gives the most satisfactory account of it. We proceed in the same manner at first as for the extraction of a cataract. The keratotome, while passing through the eye, ought to cut out, at the expense of the iris, a flap similar to that of the cornea. A pair of small scissors are then introduced into the anterior chamber, and serve to excise this flap near its base, while the point of it moreover, if necessary, is seized with a pair of eye forceps. By this means we obtain an opening with loss of substance, which cannot be closed up, and which presents every possible chance for success.

*b.* Demours, however, adopted a mode somewhat different in a case of leucomatous cornea. He made an incision into the anterior chamber, which comprised at the same time both the cornea and the iris; then with two cuts of the scissors, he circumscribed and removed a flap of this membrane of the size of a sorrel seed. The difference between these two modes is in reality very trifling. The first has some advantages, in the fact that it enables us to confine ourselves to corectomy, if we should prefer this after having commenced, but the second evidently exposes us to less risk of emptying the eye. It is from one of these processes, moreover, that are derived the principal methods extolled by the oculists of our time.

*c. Process of T. Couléon and of M. Gibson.*—M. Gibson, like Wenzel, first opens the cornea to as great an extent as for extracting a cataract, but without touching the iris. He then causes this membrane to protrude through the wound by means of a slight pressure made upon the globe of the eye; then by means of scissors, properly hollowed and curved on their flat side, he excises a disc

from it of suitable size. Forlenze has no fear of incising the cornea to the extent of two-thirds of its circumference, in order to seize the iris with the forceps or hook, and to remove a flap from it in the manner of Demours. In a thesis supported in 1803, M. Mirault gives the credit of a similar process to Couléon.

*d. Beer* asserts that all that is required is to make an opening of two lines in the anterior chamber to make the iris protrude of itself into this small wound, when the part which tends to escape outside may be immediately excised. Otherwise he seizes this membrane with an erigene, and effects its exsection as in the preceding cases.

*e. Process of M. Walther*.—M. Walther, with a view no doubt of reconciling the principles of Gibson with those of Beer, incises the cornea to the extent of about three lines, draws the iris to the outside by means of a hook, and by means of a small pair of scissors excises a flap from it of the proper dimensions. By means of a wound of nearly the same dimensions, M. Lallemant has found that he could seize the membrane with a small pair of hook forceps, draw it towards him, excise from it a flap of considerable size, and form in this manner an elliptical pupil like that of cats, vertical in its position, and two lines in breadth and six in length. The success in one case, says the author, was so complete, that the patient was enabled to follow the army of Spain in the capacity of a nurse.

*f. The needle forceps of Wagner, and of Dzondi; the raphian-kistron of Emden; the iriankistron of Schlagintweit; the plomise of Menser, and the process of Himly*, do not differ sufficiently from some of the instruments and processes described above to make it necessary for me to detain the reader with an account of them.

*g. I will make the same remark of the method of Autenrieth*, which consists in destroying a portion of the sclerotica and of the ciliary circle and processes, and removing a disc, in a word, of the globe of the eye outside the cornea, with the simple precaution to close up the opening which has resulted with a flap of the conjunctiva, which should have previously been separated from it. The best that can be done in reference to such a suggestion, is to say nothing of it, and I am astonished that Beer, Himly, Müller, Guthrie, Ammon and Ulman, (*Nimmo, Arch. Gén. de Méd.*, 2d ser., t. III., p. 237,) should have gone to the trouble of making a trial of it.

*h. Process of Physick*.—Physick, after having incised the cornea and iris, in conformity to the precepts of Wenzel, introduces into the anterior chamber a forceps terminated by plates, in some respects similar to those of our chimney tongs. The inner surface of these plates presents upon its circumference a cutting edge, which forms a scissors of peculiar description, and by means of which it becomes easy to seize hold of and remove the flap of the iris which has previously been cut out by the keratome.

*B. Relative value of the different Methods*.—I. These numerous processes show at least the constantly reiterated efforts of practitioners, to improve one of the most delicate operations of ocular surgery. Unfortunately there are often to be encountered here obstacles and difficulties, which the greatest address and most consummate skill are incapable of surmounting. When rigidly examined there can be no doubt that corectomy is preferable to the other two methods.

Nevertheless since, in order to perform it, it is necessary that the instrument should traverse the anterior chamber, it is next to impossible to have recourse to it, when the iris adheres to the cornea, or when this last membrane is opaque throughout a great portion of its extent. Coretomy presents nearly the same inconveniences without having the same advantages, since, as experience has demonstrated, the opening which it makes rarely endures beyond a few weeks. It is to coredialysis, therefore, that we should then give the preference. The same would be the case in instances of *adherent membranous cataract*, in those of any description of *opacity* whatever, situated in front or *behind the iris*, and which could not be destroyed, inasmuch as we are here obliged to bring the pupil to the circumference of the ocular diaphragm.

II. Coretomy and coredialysis alone enable us to operate by *scleroticonyxis*. Nevertheless, as they may also be performed by *keratonyxis*, we ought not, as a general rule, to prefer the first, except in strongly marked cases of anterior synechia, (*sinéchie*.) inasmuch as we almost unavoidably wound the crystalline. Should we be disposed to restrict ourselves to coretomy, but not to employ the process which I have proposed, that of M. Maunoir, or better still that of Wenzel, would appear to me to merit the preference. To perform corectomy, we may adopt, so to speak, indifferently, the process of Demours, Forlenze, Gibson, Beer, or M. Walther, though the best of all, in my opinion, would be that of Physick, such as I have modified it, or the *iridectum* of M. Onsenort, if it were possible to procure a sufficiently small punch, and one that was perfectly constructed; which, up to the present time, I have not been enabled to obtain.

III. When we decide in favor of coredialysis, the simple hook of Bonzel is quite as good as the more complicated instruments of Langenbeck, Beer, Reisinger, &c.; but I doubt if it be as easy as these authors seem to imagine, to attach in the opening of the cornea, the portion of the iris which has been brought there with more or less difficulty. Should the accident for which we desire to establish an artificial pupil have taken place as the consequence of an operation for cataract, there would be much less inconvenience here than in the other cases, in directing the instrument through the posterior chamber. In such cases, also, the bottom of the eye is too much altered to leave room to hope for much success. Nor can we perceive that it would be necessary to open into the anterior chamber as largely as has been recommended by Wenzel, Forlenze, and Gibson. It would be otherwise should the crystalline or its capsule have preserved their natural relations.

However little we may suspect opacity in these parts, they should be extracted or depressed. Perhaps, also, their extraction or their displacement should be laid down as a law, whether opacity has commenced or not. We should thus avoid the unpleasant consequences of the occurrence of a consecutive cataract, destroying the prospect of success for the first operation, as happened to me in the case of a man aged thirty years. In this respect, the opening of the cornea cannot be too large, since we not only establish an artificial pupil, but perform at the same time an operation for cataract

IV. When there are *spots in front of the eye*, and that we cannot operate by keratonyxis, the case necessarily becomes embarrassing. If the incision is made on a sound part of the cornea, the cicatrix which must result from it, and the inflammation which may supervene, very frequently destroy the transparency of the small portion which the primitive disease had respected. Upon the leucomatosus portion on the contrary, it is to be apprehended that the wound may be transformed into an ulcer, and suppurate and cause the destruction of the eye. Nevertheless many practitioners, MM. Faure and Lusardi among others, have asserted that the section of a cornea thus affected, is not as formidable as is generally thought, and go so far as to say that it agglutinates more rapidly than that of a tunic which is not diseased. This also may readily be conceived. Such tissues being less sensitive, less excitable and more approximate in their character to vegetative life, must be more moderate in their inflammation, than if they were in their normal state. If then, the cornea is opaque to a great extent, we must cautiously respect the part that remains, and penetrate through its altered portion. In the opposite case, when its transparency is not affected but by a spot which is accurately circumscribed, and of little extent, it is preferable to incise in the natural tissues.

V. Moreover, in order to be prepared to meet all the necessities and exigencies of the disease, it is well to familiarize ourselves with the greater part of the processes which I have deemed it advisable to point out, since there are cases in which each of them may become particularly applicable. I would however remark, that the method by excision is in fact the only one which presents real chances of success. All the methods by incision, whether simple or complex, are decidedly bad, and ought not any more than décollement to be adopted, unless as an exceptionable resource. I have performed the operation for artificial pupil according to the precepts of Scarpa, Wenzel, and M. Maunoir, and I have noticed that the opening in the iris, after having remained sufficiently large during a certain space of time, has almost constantly become ultimately reduced to a trifling affair. I performed it in a young girl by the process of Odhélius, and although the slit at first appeared very large, it finally became contracted to a considerable degree.

VI. These facts, and the wounds of the same membrane, during the operation for cataract, have moreover satisfied me that the different processes suggested by the alleged muscular nature of the diaphragm of the eye repose on a false basis. In place of retracting itself towards its root, the flap which I made in the iris in 1829, at St. Antoine, in a man sixty years of age, gradually approximated on the contrary, by its free border, to the point from which I had separated it. The same thing occurred to me in 1831 at La Pitié; and I have lately had a similar instance following the extraction of a cataract. Here is another example which appears to me entirely conclusive. A peasant 45 years of age, was operated upon by me at La Pitié, in the month of June, 1831. On one side the iris slipped under the edge of the knife, and I removed a flap from it which left a notch, one line deep and two in breadth, and a little nearer the ciliary circle than the pupil upon the border of which it was made. But in place of be-

ing transformed into a large oval opening, and becoming deformed, the circle of the pupil absolutely lost nothing of its regularity.

It continued to dilate and contract as before, to such degree that its two extremities appeared to be drawn towards each other, as if to establish its continuity, rather than having a tendency to retract outwards, or to be withdrawn towards the great circumference of the membrane, and to become confounded with the bottom of the notch. M. Graefe (*Arch. Gén. de Méd.*, t. XXI., p. 271,) states that he has five times performed the operation for artificial pupil with success, and M. Eckstrumer (*Bull. de Fér.*, t. VIII., p. 203) appears to have been not less fortunate in three of his patients; I have succeeded with it but twice. M. Laugier, (*Bull. de Therap.*, t. VIII., p. 380,) by introducing a needle through the cornea, has succeeded in destroying the adhesions which kept the pupil contracted. I was no less fortunate in 1835, in a patient of M. Requin. This method, which was so much extolled at first by M. Silvy, (*Mém. de l'Acad. de Méd.*, t. IV., p. 445,) for cases of obstruction and contraction of the pupil from the debris of a cataract, would be better adapted for the obstructions caused by inflammations of any kind, as pointed out by M. Siméon, (*Revue Méd.*, 1828, t. III., p. 126,) and wherever opaque flaps or adhesions should mask the pupil, or keep it immovable. I will add, that in such cases scleroticonyxis, by enabling us to depress false cataracts with greater facility, would be preferable to keratonyxis.

C. *Consequences of the operation.*—After the operation the patient is to be submitted to the same regimen, and treated with the same precautions as if he had been operated upon for cataract. Nevertheless, the accidents that follow are rarely as severe. Should we confine ourselves to keratonyxis, or even to scleroticonyxis, they are often reduced to inflammatory symptoms of the most unimportant character. If the eye has not completely, or for a great length of time, lost the function of perceiving the light, very frequently the patient, under such circumstances, may dispense with keeping his bed, and wear only a black silk bandeau during the space of a few days. The lady operated upon by Wardrop was enabled to re-enter her carriage immediately after, and without any inconvenience. An intractable patient, whom I could not restrict to any systematic course, got up on the evening of the same day of the operation, and on the following day was indisposed to make any retrenchment in his diet or occupations, yet not the slightest inflammation supervened. Out of seven other individuals whom I have operated upon, none of them experienced any inflammatory symptoms. When, however, we perform keratotomy and largely open into the cornea, like Wenzel, &c., and when we have deemed it necessary to extract or displace the crystalline or its connections, and when the natural pupil has been completely closed for a long time, it would be imprudent not to proceed in the same manner precisely as after the operation for cataract. In all these cases, as that of M. Lallemand, (*Arch. Gén. de Méd.*, t. IV., p. 69,) for example, demonstrates, the most intense ophthalmia may be readily developed. Out of an aggregate of 18 operations for artificial pupil, I have obtained only three successful results, but none of the patients were attacked with

any severe accidents. Moreover, we ought not to be apprehensive of giving too great an extent at first to the opening into the iris, for besides that the new pupil for a long time retains a great tendency to contract, we have now the proof that the absence of the iris does not abolish vision. M. Hentzchel (*Lancette*, t. V., p. 440,) relates the history of three sisters, in whose eyes this membrane was wanting, but who could, nevertheless, see very well. The same was the case in the child six years of age mentioned by M Stoeber, (*Journ. de l'Instit.*, 5th year, p. 394,) and with the persons whom I have elsewhere mentioned, (*Dict. de Méd.*, Art. *iris*, 2e edit.) I have already seen in eight or ten instances, one, or even three accidental pupils in the neighborhood of the natural one, without its being productive of the double vision mentioned by Righellini, (Portal, *Hist. de la Nat.*, &c., t. V., p. 480.) If we have to operate to remedy the consequences of an internal ophthalmia, we must be prepared to meet with a sort of true or false cataract behind the iris, and adopt measures to remedy this difficulty or destroy its effects.

### § V.—*Puncture and Incision of the eye.*

Formerly puncture of the eye was made use of in *onyx*, or effusion of pus between the lamellæ of the cornea, in *hypopyon* or abscess in the anterior chamber, in *empiesis*, or abscess in the posterior chamber, in *hydropthalmia*, and *bupthalmia*, and in all cases, in fine, where the eye was the seat of too great an accumulation, either of its natural humors or of any abnormal fluid whatever.

A. *Onyx*.—When the small purulent collections, which are met with sometimes in the substance of the cornea, have obstinately resisted antiphlogistic, emollient and discutient remedies, &c., nothing appears more rational than to open them. The operation, moreover, is so simple that it is scarcely necessary to describe it. The surgeon depresses the lower lid; causes the other to be raised up by an assistant; seizes with the right hand for the left eye, and with the left hand for the right eye, a common lancet, divides the layers of the cornea, which separate the onyx from the exterior, and repeats this puncture as many times as there are distinct abscesses in front of the eye. A cataract needle would be full as good as a lancet, and it is readily understood that we might if necessary make use, with the same advantage, of any sharp-edged pointed instrument whatever. Unless the transparency of the cornea should be irredeemably lost, the instrument ought to be directed as far from the centre of the organ as the disease will possibly permit. In the cases under consideration, surgeons of the present day do not approve either of puncture or incision. It aggravates, they say, or reproduces the inflammation, leaves among its consequences ineffaceable cicatrices, and may hasten, or even produce the suppuration of the eye. Moreover, the matter which forms the onyx, being almost always adherent to the lamellæ of the cornea, is rarely sufficiently fluid to enable a simple incision to allow of its escape. Finally this pus, which never constitutes any other than quite thin layers, spontaneously disappears as soon as the ophthalmia which produced it has subsided or is subdued. While adopting a portion of these reason-

ings, which already have been contested by Woolhouse, Mauchart, &c., I nevertheless consider the operation useful, when, as an exception, the pus constitutes a legitimate abscess. The facts that science possesses, and the last memoir of M. Gierl in particular, appear to me to demonstrate that puncture of the eye under such circumstances, presents unquestionable advantages, and that the moderns have exaggerated its dangers.

B. *Hydrocephalus*.—*Hydrocephalus*, whether accompanied or not by liquefaction of the vitreous body, whether there be or be not blood or pus effused into the humors, possesses in puncture of the eye a last resource, which at the present day, perhaps, has not been had recourse to sufficiently often. It would be doubtless imprudent to commence the treatment with this; but when the proper general or topical medications have proved unsuccessful, and that the difficulties which continue are manifestly owing to an unnatural distension of the globe of the eye, I see nothing more rational than the paracentesis of this organ. By putting a period to the compression of the retina, the iris, and of the ciliary circle, processes, vessels, and nerves, it moderates the most violent pains, and appears to me capable of preventing the most serious disturbances, and to constitute a means, if not curative, at least palliative, and one of the most valuable auxiliary remedies.

I. Paracentesis of the eye, which has been practised in Japan and China for centuries, and performed by Tuberville and Woolhouse, can scarcely be said to have been formally proposed for hydrocephalus before the time of Valentini, (*Coll. Acad.*, partie étrang., t. VII., p. 434,) Nuck, (*Journ. de Simmons*, t. I.. p. 282,) and Mauchart. In the beginning it was performed by a small trochar, which Woolhouse recommends should be plunged through the sclerotica, while Nuck directed it upon the centre of the cornea itself. At present, puncture, properly so called, has been generally abandoned. Incision in almost every case is advantageously substituted for it, except that some recommend opening into the anterior chamber, while others, as M. Basedou for example, advise the posterior chamber. Bidloo made use of a bird-beaked lancet, directed upon the lower part of the cornea. Meckren used a large triangular needle expressly made for this purpose. At the present day we more especially employ the cataract keratotome. Saint-Yves made a transverse incision in the transparent cornea. Louis proscribes too large an opening, while Heister recommends that we should incise the sclerotica. Finally, there are those who recommend a puncture first, and who afterwards enlarge the small wound by means of scissors or any other cutting instrument. But in truth, we have in reality only to choose between the process of Bidloo or rather of Galen, and that of Maitrejan and Heister. None of the others in fact attain the object better, and most of them are infinitely more complicated or much more dangerous. The species of cataract needle devised for this purpose by M. Adelmann, who has shown it to me, and which has a groove upon one of its sides, would however possess the advantage of allowing of the escape of the liquid, while at the same time it reduces the operation to a simple puncture. The incision of the sclerotica, whether outwardly or below, and parallel to the fibres of this tunic, con-

stitutes in reality a puncture of little importance, and should have the preference if the aqueous humor could always escape through it. Unfortunately this is not the case. To derive any advantage from it in simple hydrophthalmia, it would evidently become necessary to divide through the sclerotica transversely at less than two lines from the ciliary circle, and under this point of view the section of the cornea is certainly a less serious operation. It is only then in cases of liquefaction of the vitreous body, and which are distinguished from ordinary hydropsy by the projection which the iris forms in front, that the operation by the method of Heister could possess some advantage. Moreover it is of little importance in such cases, whether we follow one process or another, inasmuch as the eye is usually lost beyond redemption.

II. *Operative process.*—After having arranged the patient and assistants, in the same manner as for extraction of a cataract; and after having properly separated the eyelids apart, and fixed the eye, the surgeon makes with the point of a lancet, a bistoury, Adelmann's needle, or a keratotome, held like a writing pen, an incision of from two to three lines in length, and at the lower or outer part of the cornea, as far as possible in fact from the pupil, and in such manner as not to wound the iris. It is unnecessary then to make any pressure on the globe of the eye. The aqueous humor immediately runs out; and an evident relief is generally the immediate consequence. So long as any hope remains of preserving the organ intact, it would be dangerous to do anything to prevent the wound from cicatrizing. We should dress in the same manner as after the operation for cataract, and should a new accumulation of the liquid seem to render it necessary, repeat this puncture at the expiration of a certain number of days, after the manner of M. Basedow, who gives four successful examples of it, and as I myself have frequently done. No one moreover, at the present day, would recommend that we should imitate Nuck and certain surgeons of the last century, by placing a piece of sheet lead between the eyelids, in order to be enabled to compress the eye from before backwards, so as to make it gradually re-enter into the orbit. A practice like this, which moreover is unworthy of discussion, could not have been adopted but by those who have confounded exophthalmia, buphthalmia, and proptosis, with legitimate hydrophthalmia. Should any point on the tunics of the eye be obviously more altered, prominent or attenuated than others, there is no doubt that this point should be preferred for the paracentesis, and that we should make it a place of necessity. When buphthalmia and the projection of the eye depend upon hydropsy or a dilatation of the sclerotica, it is then hydrophthalmia also that we have to contend with, and the puncture is indicated, as in the preceding cases. On the contrary, it could have no object, and must aggravate the condition of the patient, when the disease is owing to the development of some tumor, or to the existence of some organic lesion in the orbit.

C. *Hypopyon.*—Galen appears to have been the first who proposed paracentesis for hypopyon. Nevertheless he did not have recourse to it until after having unsuccessfully made trial of succussion (succussion), so much lauded by Justus, and which Heister and Mauchart

have since thought not unworthy of reviving. According to this author, we open into the lower part of the cornea, a little in front of its union with the sclerotica, and the pus soon escapes to the outside. Aetius recommends that we should perform it with the needle at some point upon the membranes which is not inflamed.

Guy de Chauliac, Benedetti, Paré, and Dionis have adopted the precepts of Galen with success, and despite the efforts of Nuck, Woolhouse and a great number of others, who like the Arabs recommended that we should confine ourselves to one puncture to enable us to suck out the effused matter, and who even went so far as to advise leaving the canula of the trochar in place, and afterwards making use of it for throwing injections into the interior of the eye; modern practitioners also restrict themselves to a pure and simple incision, when they decide upon treating hypopyon by paracentesis. It would be in fact the *best process* to follow under such circumstances were the slightest operation then necessary, and if M. Gierl is to be believed, (*Journ. de Simmons*, t. I., p. 278;) but the small quantity of pus which forms the hypopyon very readily disappears of itself when the ophthalmia ceases; the way to augment its secretion and produce opacity of the cornea, is to open into the anterior chamber with any instrument whatever. Chronic purulent deposits, the only ones perhaps which paracentesis would not aggravate, are constituted of a matter too adherent either to the iris or the cornea, to enable us to evacuate them by means of an incision of a few lines in extent; we must place our reliance in fact upon general treatment, resolvent collyria, and an effort to put a term to such an affection, so long as it does not exceed the limits that belong to a true hypopyon, and so long as we have any hope of preserving the visual function. For all these reasons I am of opinion, with Boyer and Dupuytren, that puncture of the eye, either with a trochar or lancet, is but rarely applicable to abscesses in the anterior chamber, unless like Lehoc we should employ it with the view of renewing the aqueous humor, and at the same time for evacuating the purulent matter.

D. *Empyesis*.—In abscess of the posterior chamber, that is to say, in empyesis or empyema of the eye, it would appear at first view that all the world would concur in the necessity of having recourse to paracentesis. It would however be an error to suppose so. Though many persons have recommended it; and in fact almost all the oculists of the last century frequently made use of it, it can nevertheless be then but a feeble resource. By it we evacuate but in a very imperfect manner the morbid collection. As it soon shuts up, the accidents which belong to it are remedied but temporarily. As soon as the eye is implicated it is irrecoverably lost, and there is no use in incising it any more. We ought to excise a sufficiently large portion of it to evacuate it completely and bring about atrophy. The seton employed in China and Japan, and which had already been eulogized by Woolhouse as a substitute for puncture, and revived by Ford, (*Southern Med. and Surg. Journ.*, June, 1838; *Gaz. Méd.*, 1838, p. 617,) is a barbarous remedy, and unworthy of any criticism.

E. *Practice of the author*.—I have however found that in all these cases repeated punctures on some *region of the sclerotica which remained intact*, by means of the point of a lancet, possessed

a great deal of efficacy. So long as the eye is distended and painful, whether there be *hypopyon*, *empyesis*, *hydrophthalmia*, or *ophthalmitis*, I have found nothing better than this practice. I choose the point of the sclerotica which is most visible and projecting, and plunge in the lancet there perpendicularly and parallel to the fibres of this coat. The relief is prompt and the operation may be repeated the day after.

### § VI.—*Excision of the Eye.*

*Staphyloma* of the cornea, empyema, hypopyon, and hydrophthalmia, are almost the only diseases which sometimes require excision of the anterior part of the eye, or for which we may properly have recourse to this operation. Its object is to evacuate the organ, to bring about its atrophy, and to transform it into a simple stump, which may be adapted to the support of an artificial eye. It is therefore a dernier resource, which is not allowable except where all others have failed, and only in cases where it has satisfactorily been demonstrated that the sight cannot be preserved or re-established. In hypopyon, empyesis, and hydrophthalmia, for example, it is not to be resorted to until after incision or puncture, unless the insufficiency of these last methods should have been previously ascertained. M. Dugas, (*Ibid.*) in a case of hemophthalmia, did not decide upon it until after having lost every hope of preserving the eye. The most ancient authors had already made use of it in prolapsus (procidence) of the cornea. Galen mentions it as a common method. Aetius recommends that we should associate it with the ligature; and that before removing the staphyloma, we should pass two threads through its base crosswise. The ligature that Paul of Egina and others proposed to apply either circular, crucial, or transverse, the taxis and compression proposed by Manget, and the crucial incision of Woolhouse, are now no longer in use, and all surgeons at the present day adopt the advice of Paré or of Louis when they wish to obtain a radical cure of staphyloma of the cornea, that is to say, they perform pure and simple excision.

A. *Operative process.*—Whether it be for one disease or another, we must, as soon as we decide upon not removing the entire organ, confine ourselves to the excision of its apex. Cancerous affections alone would constitute an exception to this rule, did they ever allow of a simple excision. In penetrating beyond the iris, up to the middle of the posterior chamber, we should incur the risk of seeing the muscles retract the rest of the sclerotica and the optic nerve to the bottom of the orbit, and of having no stump to the eye after the cure. On the other hand, if we should confine ourselves to a small opening, the humors contained in the chambers would only partially flow out, and the wound might cicatrize too soon, and leave only in its place a depression which would be as great a deformity as the staphyloma itself. We should avoid these two extremes by removing almost the entire cornea and without going any farther. Then we are sure that the vitreous humor will finally escape or be dissolved, that a new accumulation of humor will not take place to such extent as to produce a painful distension in the posterior chamber, and that after cicatrization, the muscles will be enabled to impart to the remains of the or-

gan the greater part of the movements which it executed in its natural state, and transmit them to the artificial eye. Nothing is easier than an operation of this kind. The crucial incision with excision of the four flaps, as Richter recommends, is altogether useless. The patient being properly arranged and secured, we divide the lower half of the cornea with Daviel's instrument, the point of a lancet, or any bistoury or keratotome, in the same way as for extraction of the crystalline. The flap is immediately seized with a good pair of forceps, and detached in the remainder of its circumference, by means of a very sharp pair of scissors or of a bistoury directed from below upwards. An erigene plunged into the middle of the segment to be removed would render its excision still more prompt and certain in intractable subjects or in those in whom it might be difficult to steady the eye. This process, more simple than that of Terras, who passes a thread through the tumor in order to exsect it more readily afterwards, would enable us in fact to remove as rapidly as possible, and with a single stroke of the instrument, the totality of the cornea or staphyloma, by directing upon its base a good bistoury, which should be made to act either from above downwards or below upwards. The guillotine of Guérin, extolled by Demours, would not be more convenient, and has no claim to a preference.

I. *Consequences.*—There is generally developed after this excision a sufficiently active inflammation in all the parts contained in the orbit, together with fever and cephalalgia, and sometimes even symptoms much more serious. In general, however, at the end of from eight to fifteen days, the swelling which it has occasioned begins to diminish; the suppuration, at first abundant, soon dries up, and towards the end of the month, or a little sooner or a little later, we are enabled to adjust the artificial eye. As it is not an operation without danger, we ought to make this known to those who demand it for simple deformities, and ought not to perform it under such circumstances, except at their solicitation, as in cases, for example, of ancient staphyloma, unaccompanied with pain. When, on the contrary, the disease which it is designed to remedy is dangerous in itself, as empyema, hydrophthalmia, &c., we must not hesitate. Before such affections as these, every apprehension should be banished. Punctures of the sclerotica, I should think, would diminish the inflammatory reaction and ought to be had recourse to.

### § VII.—*Extirpation of the eye.*

Though extirpation of the eye was not clearly described until near the close of the sixteenth century, there is however every reason to believe the ancients had had recourse to it quite frequently. There were two principal classes of conditions in which it was made use of: 1st, for proptosis, or the fall of the eye; 2d, for deep-seated diseases and degenerations of this organ.

A. *Proptosis—Exorbitism—Fall of the eye.*—J. Lange, who wrote in 1555, boasts of having caused the re-entrance into the orbit of an eye which certain surgeons had proposed to extirpate. Donat, at a little later period, in 1588, endeavored to demonstrate the inutility of this operation, and maintained that compression, aided by the judi-

cious employment of internal remedies, always triumphed over those diseases which seem to require it; which proves at least that for a length of time it has been known to practitioners. Bartisch, therefore, who only published his work in the year 1583, has no claim to the merit of the invention, and has only drawn attention to a serious operation, and one which had already been performed, but the execution of which he rendered more easy.

Some authors, as Covillard, Lamswerde, and Spigel, also profess to have cured without an operation, patients in whom the eye violently protruded from the orbit and hung upon the cheek. A. Seigneur stated to Guillemeau, (*Oeuvres Chir.*, p. 743, edit. 1612,) that his surgeon seizing an eye which had fallen to the ground, successfully replaced it in the orbit. An eye which had issued from the orbit in consequence of inflammation, was replaced by Loyseau, (*Obs. de Méd. et de Chir.*, p. 46; *Corps de Méd.*) The eye of Captain Naldi, according to Rhodius, (Bonet, t. III., p. 50,) which had been driven from the orbit by a blow given by a Turk, miraculously returned to its place by means of a large cupping glass upon the occiput. In a young infant, the eye which had inflamed and become as large as an egg, and escaped from the orbit, returned there by means of topical applications administered by F. Plater, (Bonet, t. III., part 2nde, p. 50.) Verduc (*Pathol. Chir.*, t. II., p. 44-47, in 12,) does not admit the fact of Covillard, but Lemaire, (*Eaux de Plomb.*, &c., p. 59,) saw the same thing in a hemiplegic at Plombières. Salmuth, (Cent. 2, hist. 42, c. stat d'Ettmuller, *Prat. Méd.*, t. II., p. 401. French trans.) speaks of an epileptic, in whom the eye during a paroxysm protruded to the size of the fist, and returned after this had ceased. Verduc, (*Pathol. de Chir.*, t. II., p. 244, in 12, 1719,) moreover, admits to have seen a young painter, whose eye descended to the middle of the cheek, and which in less than the space of an hour, descended from, and returned to the orbit more than six times. In a patient of C. White's, (*Cases in Surgery*, 1770; *Gaz. Salut.* 1771, No. 27, p. 3,) the eye, luxated upwards by the contraction of its levator muscles, was relieved by the taxis: a wound made by a fragment of pipe-stem which had entered at the bottom of the orbit, was the cause of the difficulty. In a case of protrusion of both eyes, says Rossi, (*Elem. de Méd. Oper.*, t. I., p. 203,) which took place after violent vomitings, I found after the remedies which I had employed to give greater strength to the muscles of the eye in restraining the globes, that the use of electricity and camphorated vapor produced a marvellous effect. M. Champion has known an old lady who was affected with strabismus in the left eye, and in whom this infirmity succeeded after the reduction of the eye, which had been driven from the orbit out upon the cheek in consequence of a blow received upon the temple. I frequently meet, says the same practitioner, with a retired officer, who declares that he had a protrusion of the right eye which it had been proposed at the time to excise, but which was perfectly reduced and is now in possession of all its functions. The accident was said to have been produced by a ball which had traversed the left orbit, and which had come out at the inner angle of the right one. Maitrejan has long since shown the impossibility of such a result taken literally; but Louis has very

justly remarked, that in divesting the assertions of observers of every thing hyperbolical that they possess, we find in them the proof that the optic nerve and the muscles which surround it may undergo a considerable degree of elongation without necessitating the extirpation of the eye. We have, moreover, numerous examples of this elongation effected in a gradual manner, in cases of exostoses, and tumors of every description in the orbit, nasal fossæ, maxillary sinus, &c. If the eye really hung down on the outside, in consequence of a traumatic lesion, we should then, instead of attempting to replace or preserve it, complete its separation and remove it immediately. In such cases there is no process to be given. A single cut of the scissors or bistoury sometimes suffices, and the conduct of the surgeon must necessarily be regulated according to the accidents which exact so severe a remedy. When on the contrary the eye has only been expelled gradually from the orbit, whether entirely or partially, or whether it be or be not in itself disorganized, we should do wrong to attempt its extirpation.

It is not to the eye itself that the resources of surgery are to be addressed. Let the operator destroy, or cause the disappearance of the principal disease if he can, and the displaced organs will soon resume their normal situation. St. Yves cured a severe exophthalmia, by effecting the resolution of scirrhosities which had been formed in the bottom of the orbit. Brossaut, who is mentioned by Louis, has seen the vision re-established, and the eye re-enter into its cavity, when the exostosis of the ethmoid which had caused its expulsion had been destroyed ; Guérin of Bordeaux, and Dupuytren, have brought about the same result by removing the various tumors and cysts, of which the tissues which surround the eye are very frequently the seat. Extirpation of the eye therefore is not called for in buphthalmia nor exophthalmia, whatever may be their cause, nor in hydrocephthalmia, empyesis, or staphyloma.

B. *Cancers of the Eye and the Orbit.*--Cancerous affections only allow of our undertaking extirpation of an eye which has not been displaced. Even when their existence has been well established, the question still remains whether the operation should be attempted. Those who go for the affirmative, with Desault, &c., argue principally that cancer of the eye is much more frequently observed in children than in adults, and that in the younger period of life its reproduction is much less to be apprehended than after puberty. Others appeal to the researches of M. Wardrop, which show that the disease is almost always constituted of *fungus hematodes*, a melange of encephaloid, erectile, colloid or melanotic tissue, or one of those substances only. But since there is no variety of cancer which repudiates, either in the same place or elsewhere, with more obstinacy than this, they maintain that it would be inflicting unnecessary suffering upon the patient, and that we ought to limit ourselves to simple palliatives. What analogy and reasoning had foreshown to them, experience has but too often demonstrated. Whatever, in fact, some authors may have said on this subject, the labors of the ancients, like those of the moderns, sufficiently prove that the ablation of cancer of the eye is not less liable to a return of the disease than that of any other part. I would not, however, therefore conclude that we ought to

remain inactive. Far from that, I think we ought to exert ourselves to operate before the viscera have had time to become invaded by the morbid germs, and as soon as the nature of the disease appears no longer doubtful, and so often as it shall appear to be practicable to remove it entire. All this, however, belongs to the general question, whether it is advisable or not to operate for cancer.

1. *Operative process.*—*a. Process of Bartisch.*—The extirpation of the eye, much more frightful than difficult, more formidable by its consequences than its immediate dangers or the difficulty of its execution, may be performed by quite a number of different modes. We find no details on this point in authors before the time of Bartisch, who, in order to excise the diseased parts, found no other instrument necessary than a species of spoon with cutting edges, like that used by shoemakers. Though no person at the present day would venture to recommend so crude an instrument, it is incorrect to say that it exposes to the risk of fracturing the bones, and that it renders the operation much more difficult than with any other knife. Its dimensions, it is true, do not allow of our carrying it as far as the extreme depth of the orbit, but I do not find that it is often required to go to this distance. To be just, therefore, we should limit ourselves to its rejection as useless, or possessing but little advantage. The excavated scissors of Delpech, (*Dict. des Sc. Méd.*, t. VII., p. 528,) and the concave scalpel of Mothe, (*Journ. Gén. de Méd.*, t. XLVIII., pp. 121—136,) are scarcely better.

*b. F. de Hilden*, who had occasion to extirpate an eye in 1596, proposed at first to embrace the projecting part by means of a string purse. After having censured the instruments of Bartisch, (Cent. 6, obs. 1,—Bonet, *Corps de Méd.*, p. 389,) he speaks of the simple strangulation extolled by C. H. Chapuis. Detaching the tumor from the eyelids by the cuts of the bistoury, he employed for the section of the muscles and optic nerve a sort of scalpel with two cutting edges, curved flatwise, and truncated at its point. In this process we already recognize the principles of a more enlightened surgery, and the practitioner mentioned by Bartholin (Louis, *Dict. de Chir.*, t. II., p. 124,) is justly censurable for not having profited by it about fifty years subsequently, and for not having recoiled at the idea of tearing out the eye by means of a pair of hooks. The instrument of Hilden, though more ingenious, has nevertheless met with the same fate as that of Bartisch. If Job-a-Meckren succeeded with the spoon of the oculist of Dresden, and Muys and Leclerc with the knife of Hilden, Lavauguyon maintained that a good lancet fixed on its handle would always suffice, and might be substituted for them. St. Yves, for every step of the operation, found nothing else required than a thread to secure the cancerous mass, and a cutting instrument, which he does not designate. Nor do the observations of Bidloo make any mention of a particular knife; except it be a long bistoury bent to an angle, near its handle, and which is also praised by V. D. Maas.

*c.* It was Heister who showed, by sufficiently good reasoning, that an erigene or forceps, and the ordinary bistoury, which Hoin of Dijon had already found to answer in 1737, are sufficient for this operation.

*d.* Things were in this state when Louis undertook to systematize the ideas of surgeons on the extirpation of the eye. When the tumor

no longer holds on except by the root of the recti muscles and of the optic nerve, we must, says this surgeon, make use of a pair of scissors curved flatwise; pass them to the bottom of the orbit, then divide the musculo-nervous pedicle, and at the same time act with them as with a spoon to bring the whole forward.

e. Desault, who, in the first years of his practice, had adopted the process of Louis, ultimately abandoned the scissors as useless, and confined himself to the simple bistoury, which in fact is better than the curved bistoury of B. Bell. Sabatier, Boyer, Dupuytren, and all the operators of the present day, conform themselves to the recommendations of Louis or of Desault almost indifferently. With the curved scissors we run no risk of penetrating into the cranium or into the zygomatic fossa. Their concavity accommodates itself better to the form of the tumor, whose pedicle also they would seem to embrace with more security. But with a bistoury it is not necessary to change the instrument, from the commencement to the end. The section of the soft parts is more neat, and all that is required is to incline it in one direction while the eye is drawn in another, in order to reach with facility the root of this last. We should have to be very unfortunate or very inexpert to perforate with its point into the optic foramen or maxillary and sphenoidal fissures. It is therefore here also, as we have so often already said, an affair of choice or circumstances, much more than of necessity.

*First stage.*—The patient may, if necessary, be kept seated upon a chair, but it is better to operate upon him in bed, taking care to raise up his head considerably. The surgeon being placed upon the side of the affected eye, acts differently according as the surrounding parts are or are not invaded by the cancer. In the first case he adopts the precept of Guérin, and makes two semilunar incisions, which enable him to circumscribe the base of the orbit and to detach the eyelids from it in order to remove them with the rest of the disease. In the second case he is to do all in his power to preserve the connections of the eye. If they have contracted adhesions without having undergone an actual disorganization, he dissects each eyelid on its inner surface and reverses it outwardly. When the globe of the eye is found to be free behind, all that is necessary is to prolong with one cut of the bistoury the outer palpebral angle to the extent of about an inch towards the temple, as Acrel, and not Desault, appears to have been the first to have formally recommended. In all cases an assistant secures the head of the patient, and keeps himself prepared to follow and to favor all the movements of the operator. This last secures the projecting part of the tumor with his hand if he can, after the manner of Desault. Otherwise he makes use of a simple erigne or double hook, an erigne forceps like that of Museux, or the string purse of F. de Hilden, or better still, as St. Yves recommends, (or a strong simple ligature or ribbon cross-wise,) after the manner of Chabrol, (*Gaz. Salut.*, 1782, No. 49, p. 4,) passed by means of a needle through the degenerated mass.

*Second stage.*—The operator takes the bistoury in his right hand, holds it as a writing pen, and directs its point to the great angle of the eye; plunges it in while grazing the ethmoid bone as far as to the neighborhood of the optic foramen, makes it pass round flatwise the entire

lower semicircumference of the orbit ; divides the attachment of the small oblique muscle, the oculo-palpebral groove of the conjunctiva, and some adipo-cellular filaments ; then brings it back into the inner or nasal extremity of the wound ; directs its cutting edge upwards and then outwards ; divides the great oblique muscle, and endeavors to remove at the same time the lachrymal gland, when, by passing around the orbital vault, he arrives near the temple and finds himself at the point of uniting the two wounds by their outer extremity.

*Third stage.*—The eye now holds no longer than by means of a pedicle formed by the four recti muscles and the optic nerve. If, in order to divide this pedicle, we prefer the scissors, the operator glides them upon the inner rather than the outer side, with their concavity turned towards the tumor to as great depth as possible, and with a single cut completes the separation of the cancer. If any bridles still retain it, they are to be rapidly divided in the same manner, while with the other hand we make the proper tractions. If, in place of the scissors, the surgeon has recourse to the bistoury, he directs this also, by preference, upon the inner side. In this direction the orbital wall being almost straight, it is easy, by inclining the point of the instrument outward, to cross and divide the musculo-nervous pedicle. I am ready, however, to avow that with the bistoury, as well as with the scissors, it would not be attended with much more difficulty to attain the same object by following the temporal wall of the orbit. It was, in fact, here that Desault usually entered it by choice, remarking that this route was the shortest and most convenient.

An object more worthy of attention, is that we are more certain by this mode to avoid falling upon the maxillary and sphenoidal fissures. Whether the lachrymal gland be cancerous or not, we must when we have missed it, seize it immediately after with an erigene or forceps and extract it. The secretion of tears being no longer of any use must necessarily be injurious. It must be by inadvertence that some have thought proper to sustain the contrary opinion. This gland when left in the orbit after the removal of the eye, kept up a copious discharge of tears with accidents, which obliged M. Nelle (*Encyclogr. des Sciences Méd.*, 1838, p. 250) to extirpate it six months subsequently. We may moreover, by directing the forefinger into the orbit, accurately ascertain the condition of the parts that remain ; and if there are any of them which are not sound, we should endeavor to reach them before we have finished the operation, and remove or destroy them, either by means of the bistoury, the scissors, or even the rasp.

*II. Dressing.*—No artery of any size can have been wounded. All those which are divided come from the ophthalmic ; and their ligature is unnecessary, even though the blood should flow in abundance. Small balls of lint sprinkled or not with colophane and more or less pressed upon, would be sufficient to arrest it. In ordinary cases we fill up with lint the void which has been left, but moderately and as if for the purpose of supporting the posterior surface of the eyelids. The sponge, which has been proposed by some practitioners in lieu of this substance, would have the disadvantage of

irritating the tissues by becoming swollen in the middle of a solid cavity. The small bag filled with emollient cataplasms also, as recommended by M. Travers, and which is placed over all the other dressing in order to prevent the slightest degree of compression, does not appear to me to present any real advantages. At the expiration of four or five days the suppuration is established. The lint is removed without any effort. Nor is there any objection if we wish to make the removal of the first dressing still more simple, in covering the bottom of the wound with a fine linen besmeared with cerate and perforated with holes, and which serves as a sac to the compresses, and when the eyelids have been removed may be easily reversed upon the contour of the orbit. A soft plumasseau, and which is sufficiently large to support in front the more deep-seated portions of the dressing, together with a long compress placed obliquely, and the monocle bandage, complete the dressing, which the least skillful surgeon moreover will know how to modify in a proper manner, should circumstances make it necessary. After its first removal, which is from the third to the sixth day, the dressing has no longer any thing particular in it. The wound being washed with tepid water and gently wiped out, should be supplied each time with a small quantity of dry lint. The eyelids being gently raised up and protected by small bandelettes besmeared with cerate, are finally covered with a soft plumasseau and a compress; the whole is supported by the monocle and a few turns of bandage. The cure is usually effected between the third and tenth week.

III. *Remarks.*—Though the preservation of the eyelids would render the deformity less repulsive, it would nevertheless be preferable to sacrifice them rather than not to destroy the remotest vestiges of the disease. The incision at the external angle renders the remainder of the operation more easy, and does not involve any particular accident. One point of suture or a simple adhesive strap would moreover effect its reunion without any exertion or inconvenience. If we should commence by the superior incision, the blood which oozes out would necessarily create a slight degree of embarrassment for that below. The eyelids having their fixed point upon the inside, we manipulate with more security from the nose towards the temple than from the outer to the internal angle. When the globe of the eye alone is affected, as it is attached in front only by the fold of the conjunctiva and the oblique muscles, it is not necessary to carry the instrument over an inch in depth. On the contrary, when adhesions are established between the soft parts and the bones, we must go as deep as the bottom of the orbit. In such cases the spoon-knife of Bartisch, the scalpel of Hilden, and the bistoury of Bidloo, would incur the risk of fractures, which it is always advisable to avoid. It is under such circumstances also that any sharp-pointed instrument whatever, if directed without precaution, might fracture the frontal bone and penetrate into the brain, should we, in order to reach with more certainty the levator muscle or lachrymal gland, elevate its point too much; or it might arrive into the maxillary sinus and divide the suborbital nerve or vessels, if we should incline it too much in the opposite direction; or penetrate into the nasal fossæ inwardly, or into the zygomatic or pterygo-mix-

illary fossa posteriorly, and wound the second branch of the fifth pair of nerves (*nerf trijumeau*) or the internal maxillary artery; or in fact penetrate into the cranium through the sphenoidal fissure, and wound the middle lobe of the cerebrum. If the bistoury, however, should not graze the bones, we should incur the risk of not removing all the cancer, and of being obliged to operate again afterwards. The lachrymal gland in particular being almost entirely concealed behind the external orbital process, cannot be extracted with the eye except with a good deal of difficulty.

The rasp recommended by Bichat, or the chemical caustics, would be less dangerous than the *actual cautery*, at least on the side of the orbital vault, should it become indispensable to go beyond the soft parts. In fact, the proximity of the brain would, under such circumstances, render the application of the iron extremely dangerous. Should the fungus have commenced at the exterior of the eye, there would be reason to apprehend that there were branches of it in the direction of the temple, sinus maxillary, the nose, &c. M. Simonin (*Decade Chir.*, p. 21, 1838,) having extirpated the eye, was obliged to resort to tamponing; and his patient died. The roof of the orbit was perforated, and blood was found under the dura mater. Being desirous of arresting the blood and of destroying some remains of cerebroid tissue in the temporal fossa and maxillary sinus, I applied there an olive-shaped cautery, avoiding with care the vault of the orbit. The patient died on the third day, and we found an extravasation of blood in the corresponding lobe of the brain. Was it the operation which was the cause of this apoplexy, or was it not only a mere coincidence? Though we may be in the habit of employing the same hand for the first and second incision, it nevertheless appears to be more convenient for the right eye, for example, to execute that of below with the right hand, and that of above with the left one, unless we wish to make one of them from the temple to the nose. We divide the levator muscle, because otherwise it would constantly tend to draw the upper eyelid inwards after the cure, and might in this manner still further increase the deformity. I have forgotten to say that Dupuytren began with the upper incision, and that he terminates by detaching the organ from the summit to the base of the orbit.

### § VIII.—*Artificial Eyes.*

Nothing, doubtless, would be more desirable than to be enabled to make use of an enamel eye, when the disease has permitted us to preserve the integrity of its movable coverings; but we must not flatter ourselves too much on this point. The orbit, like all other natural cavities, when once emptied and void shrinks upon itself. Its walls approximate gradually from the bottom to the exterior. Its circumference diminishes and becomes depressed in such manner that at the expiration of a certain time, it is found to be almost completely effaced by this contraction, and also by the development of a fibro-cartilaginous substance. The eyelids being obliged to conform themselves to this retraction, contract adhesions on their posterior surface, are deformed, and become in most cases incapable of adapt-

ing themselves to the artificial organ that we wish to place behind them. If the patient, therefore, is desirous of concealing his mutilation, we must be prepared whether the eyelids have been destroyed or not, to be under the necessity of employing only spectacles that have been artistically arranged, or with a colored plate, which is to be fixed in front of the obliterated cavity. The ancients, as it appears, devoted more attention to these matters than ourselves. We find that they had two species of artificial eyes, one to be inserted as at the present day behind the eyelids; the others, which were still used in the time of Paré, who is said to have been the first who spoke of them, and which were a sort of convex plates upon which the anterior part of the eye and its coverings were painted in wax colors, were to be kept in place by means of a spring. Formerly the first were made of gold or silver: at the present day the enamel is properly preferred. In these eyes everything is to be represented, the cornea, the iris, pupil, the sclerotica and its vessels. To apply them, one of them was held by the extremities of its longest diameter with the forefinger and the thumb, in order to pass its upper border under the frontal eyelid, while the eyelid was gently raised up with the other hand. This being done, it enters so to speak of itself, as soon as the other eyelid is depressed. In order to remove it when going to bed at night, the patient glides under it the head of a pin, and depresses the lower eyelid while drawing the lid forward. Being deposited in a glass of water during the night, this eye should be carefully cleansed every morning before being replaced. It is unnecessary to remark that its dimensions ought to be in relation with the orbit of different individuals, and that it is important that another eye should be substituted as soon as the first begins to change. When the enamel eye has been properly constructed, and that the two posterior thirds of the natural eye remain to form a stump, the resemblance sometimes is so striking as to produce a complete illusion. In the contrary case, as it is not susceptible of movement, it remains fixed in the centre of the orbit, and unfortunately cannot be concealed in those who are obliged to wear it.

[M. Morant, of Mettrey (*Arch. Gén. de Méd.*, June, 1844, 4e sér., t. V.) having found cases of epidemic ophthalmia accompanied in the beginning with coryza, was thereby induced to try repeated *cauterizations* to the mucous membrane of the nasal fossæ, which proved in many instances an effectual remedy.

*Encysted spheroidal liquid tumors in the anterior chamber of the eye*, with the capsule and contained liquid more or less transparent, and the whole adherent to the iris, have been noticed in a few instances, (see a case by J. Dalrymple, *London Lancet*, August, 1844, and Tywell on *Diseases of the Eye*—also *Archiv. Gen.*, Paris, Mars, 1845,) and are cured either by puncture or by dissecting out the cyst.

*Abrasions of the cornea for cure of Opacity*.—M. Malgaigne exhibited to the Royal Academy of Sciences of Paris, April 28, 1845, (see *Arch. Gén.*, June, 1845, p. 236.) a young girl in whom an opacity of the cornea was completely removed, and transparency restored, by an abrasion of one half the thickness of this coat two years before. T.]

## CHAPTER III.

## DISEASES OF THE MOUTH.

## ARTICLE I.—LIPS.

§ I.—*Harelip.*

The labial fissure known under the name of harelip, is either acquired or congenital. That which takes place after birth is noticed almost as frequently upon one lip as upon the other; the congenital, on the contrary, up to the present time has rarely been observed except on the upper lip. The facts cited by Meckel and Nicati, who profess to have seen it on the lower lip, are truly exceptions. Since Louis maintained that the harelip is not accompanied with any loss of substance, Blumenbach, Tenon, Béclard, Meckel, &c., have endeavored to explain its formation according to certain laws of the organism, and to show that its different modifications were the result of an arrest of development, (*arrêt de développement.*) Three portions, according to some, constitute the upper lip in the beginning, a median and two lateral. There are even four, according to others, who maintain that the middle part is also divided primitively into two. According to this hypothesis simple harelip is owing to one of the embryo fissures of the lip having persisted, and the proof of this, they say, is that it is almost constantly found outside of the median line. When the two lateral parts remain isolated from the middle part the harelip is necessarily double. If the authors of some observations already ancient, and more recently Moscati, were not deceived, and if they have really seen the harelip placed exactly in continuation with the septum of the nose, it could be explained by admitting the non-union of the two halves of the median lobe of the lip. Finally, at the lower lip, where, as in the case of Tronchin, (*Petit, Dissert. sur le bec-de-lièvre*, p. 5, 1826, Strasbourg,) it induces marasmus by the loss of saliva, the congenital harelip must always occupy the median line, because in its formation they say it never has more than two portions. Numerous researches on embryos and the fœtus at every period, induce me to believe that these ideas are the result of erroneous observations or gratuitous suppositions. Harelip is not always without loss of substance, and the lips are no more formed of two, three, or four portions, at three, four, six, or eight weeks, than at three or four months. As soon as we see them begin to point they appear to be entire, like the buccal aperture that they accurately encircle. The contrary happens only by accident. Harelip, like most other monstrosities, has appeared to me to be much more frequently ascribable to some disease than to a defect in its natural evolution. This doctrine, which I endeavored to disseminate since 1825, counts at the present time powerful advocates. I see with pleasure for example, that M. Cruveilhier fully adopts it. If he promulgates it as his own, it is probably because he has not taken notice of what I have said of it in various places in my publications, especially in the first edition of my *Tocology*, and of this present work.

A. *Simple Harelip*.—1. *Analysis of the methods*.—Though harelip is one of the most common deformities of infancy, it has nevertheless attracted but very little attention from the ancients. Celsus, who was the first to mention it, speaks of it however quite obscurely. The Arabs make but slight allusion to it, and every thing goes to show that up to the time of Franco or Paré, its treatment had not been the object of as much attention as it merits. At the present time, however, this is a point of practice which seems to leave nothing to be desired. To effect the cure three indications are to be fulfilled. Its borders are to be abraded, its two sides approximated, and the two lips of the division maintained in perfect contact until they have become agglutinated.

a. *Abrasion*.—It was with the *hot iron* that Abu'l Kasem, as well as Ludovic, effected the *abrasion* of harelip. *Butter of antimony*, or some other chemical caustic, was preferred by Thevenin, and Hunter made use of nitrate of silver. Chopart, yielding in this matter to the advice of Louis, considered that he would succeed better by applying upon the borders of the fissure which he wished to inflame, two strips of *blister plaster*. Such means could not have, and in fact have not produced any but imperfect results, and have properly been abandoned. *Excision* only, which had already been in use in the time of Celsus and Rhazes, is allowable at the present day. In order to effect it, D. Scacchi and Dionis made use of the *ordinary scissors*, and Henckel of *blunt-pointed scissors*, (*ciseaux boutonnés*.)

M. A. Severin and Acrel, on the contrary, gave an exclusive preference to the *bistoury*, which Louis and Percy endeavored to bring into general use; while Roohnuyzen, De Horne, Le Dran, and B. Bell, had recourse almost indifferently to the one or to the other of these two instruments. The partisans of the *bistoury* maintain that it produces less pain, gives a neater wound, and one that is less disposed to suppurate; that the scissors cutting much more by a pressing than by a sawing movement, contuse the tissues and make a bevelled wound, or one with a double oblique plane, which is but little favorable to immediate union. Experience has a thousand times demonstrated the slight foundation there is to these objections. Bell being desirous of ascertaining the fact, operated on one side with the scissors, and on the other with the bistoury, without apprising any person of it. The patient, first embarrassed in giving an answer, ultimately declared that the pain had been more acute at the side upon which the bistoury had been used. The scissors, adopted in preference by Van Horne, (*Introd. Method de la Chir.*, Severin, *Med. Effic.*, S. 28,) Lombard, (*Clin. Chir. relat. aux Plaies*, p. 38, 1802,) &c., have the advantage of requiring no point d'appui, and of instantly dividing every thing that we wish to remove. Desault, who earnestly defended them, recommended that they should be very thick, and that the blades should be strongly sloped. Those which are preferred at the present day, and which bear the name of those of A. Dubois, are constructed upon this principle. In order to increase with greater effect the power which is to move them, a great relative length is given to their handle. Their blade, which is short and solid, in this manner cuts with all the precision

desirable. It would be an error, nevertheless, to conclude that the bistoury would not answer. As to the manner of its employment, it has singularly varied. Le Dran, imitating Guillemeau, began by plunging in its point through the lip from the mouth towards the skin, a little above the summit of the division, and afterwards divided perpendicularly from above downwards, or from behind forwards, as far as to the labial border, doing the same afterwards at the opposite side. B. Bell adopted a course directly the converse of this. Placed behind the head of his patient, with the bistoury held as a writing pen, he made his incision set out from the free border of the lip, and extended it from below upwards and from before backwards as far up as above the summit of the abnormal fissure. Enaux, after having destroyed the folds and adhesions which unite the alveolar arch to the lip, glides behind this last a piece of cork, upon which he recommends that the lower angles of the harelip should be supported, in order that the bistoury may thereby be furnished with a point d'appui. In place of the cork, recommended by Enaux, we generally confine ourselves to a piece of pasteboard, or simple playing-card, or portion of soft wood. The forceps, or *morailles*, either of metal, like those of J. Fabricius and Lauth, (Erhmann, *Dissert. sur le bec-de-lièvre*,) or of wood, like those used by M. A. Severin, which served to fix the lip while its exsection was being made, which by the greater breadth of their posterior branch, could replace the piece of pasteboard which the use of the bistoury required, and which also had for their object to aid the approximation of the two abraded borders, and to prevent hemorrhage, have been long since rejected from practice. Heister, Acrel, and B. Bell are, I believe, the last authors who have thought proper to recommend them.

*b. Reunion.*—After the abrasion of its borders, the harelip is found reduced to the condition of a simple wound, and its immediate reunion is to be attempted either by means of suitable bandages or the suture, or by combining those two modes together. Franco, who confined himself to plasters fixed upon the cheeks, and small strips crossed under the nose, in order to make what he called the dry suture, then by a containing bandage; F. Sylvius, who, according to Muys, succeeded with the adhesive plaster alone, also supported by a bandage, and Purmann and G. W. Wedel, who, it is said, were not less fortunate, found in Pibrac, and especially in Louis, a warm defender. According to this author, the bloody suture is not only unnecessary, but also injurious. Unnecessary, because the harelip being unaccompanied with any loss of substance, it is always practicable to effect its approximation by means of the uniting bandage for long wounds; injurious, because its presence is a permanent source of irritation, which cannot fail to bring into action the muscular retraction. Following out this principle, Louis used only a single point of interrupted suture, and to complete the reunion employed a simple band. The ideas of Pibrac, who desired, so to speak, to proscribe the suture from surgery, appeared to find in this operation a judicious application. Valentin, in order to effect a more perfect coaptation, devised a clasp or sort of double flat forceps, capable of embracing the two sides of the wound, and of being approximated at pleasure by means of a transverse piece and screw. Enaux, (*Acad. de Dijon*, 1783, t. II.,

p 220,) in order to avoid the contusion and unequal compression made by the instrument of Valentin, proposed a bandage, the model of which exists in the museum of the faculty of Paris, and which by being attached by as many circular arcs at the top of the nape, at the vertex, and under the lower jaw, presents two pelotes which are intended to push the soft tissues forward, when they are applied upon the cheeks, and which may be reunited in front of the wound by passing a strip from one to the other.

Evers rejects all these modes, and confines himself to two adhesive strips, which he crosses obliquely (*en sautoir*) below the nose. M. Dudan has since invented, with the same object, a new clasp based upon the principle of that of Valentin. For another we are indebted to M. Montain, (*Therapeut. Méd. Chir., &c.*, 1836, p. 16,) who assures us that he has made use of it with advantage both in children and in adults. Brunazzi (*Gaz. Salut.*, 1792, p. 294, 12 July,) Giraud St. Rome (*Soc. Méd. de Marseilles*, 1811, p. 23,) and M. Kluykens (*Bull. de la Fac. de Méd.*, 1811, p. 184,) have also obtained successful results with the contrivances of their invention. There is no doubt that in this manner we may sometimes cure harelip; but it is incontestable also, that in the majority of cases the reunion is badly and imperfectly made, and that there frequently remains a groove either in front or behind, and at the lowermost part a notch almost as disagreeable as the first disease, while the bloody suture, if properly adjusted, protects us from all these inconveniences. It is also the one which is exclusively used in our time, and the bandages, including that of Terras, (*Lassus, Méd Operat.*, t. II., p. 388,) are no longer recommended except as accessories.

c. Celsus, who *sewed up* the harelip, does not give sufficient details to enable us to understand what kind of suture was employed in his time. It is probable from what Albucasis says of it, that the glover's suture was the one made use of by the Arabs. Others, as Heuermann, Ollenroth, and W. Dros, for example have recommended the *interrupted* suture, which was also preferred by Lassus, in order not to be obliged to leave inflexible metallic stems in the wound. There is no kind of suture, even the *quilled*, which has not had its partisans, though the *twisted* suture is the one which has been almost always preferred. In order to have a kind of twisted suture, M. Van Onsenort places upon each side of the borders of the wound a narrow ivory plate pierced with three holes; having introduced his threads with an ordinary needle, he knots them on the plate on the left side. M. Mayor (*Gaz. Méd.*, 1838, p. 737,) recommends one or two points of suture attached to (*entrainant*), a roll of lint or cotton, and which are to be fixed upon a similar border. A. Paré, the first author who describes it in exact language, made use of the twisted suture by means of needles furnished with eyes, and which he inserted from one side of the wound to the other, and afterwards fixed by means of turns of thread passed in a figure of 8 round their extremities.

d. Fabricius ab Aquapendente employed flexible *needles*, the extremities of which, after having inserted them, he bent forwards. Those of Roonhuysen were angular or triangular, like those of Paré. He surrounded them with a thread of silk and cut off their point with the cutting pliers. Dionis recommends that they should be of

steel and curved. La Charrière, in place of clipping off their points like RoonhuySEN and Dionis, used only a small compress between the skin and their extremities. In order to introduce them without difficulty, notwithstanding their small size, Heister made use of a needle handle, and J. L. Petit, who made them still stronger, and provided each of their two extremities with a head, fabricated them of silver and conducted them by means of a sort of punch. Le Dran preferred that they should be of gold, in order that they might be at the same time very solid, though sufficiently firm, and not oxydizable, and that they should have a flattened point and be provided with a head, to avoid the employment of a needle handle. If gold and silver possess the advantage of not rusting, they also have the inconvenience when we wish to make cutting instruments of them, of not penetrating as easily through the tissues. In consequence of this, Sharp proposed to solder upon his silver needles a spear-shaped steel point. Wedel asserts that ordinary needles are sufficient, and that we should surround them afterwards with a hempen thread. De la Faye maintains that without having recourse to so much preparation, strong long copper pins, in a word, German pins, are preferable to all others. As their point might wound the patient, Mursinna recommends to protect it afterwards by means of a small piece of quill. Le Dran had found it more convenient to make use, for this purpose, of a small ball of wax. Arnemann (Sprengel, t. VII., p. 136), had them hollow, the head and point of which might be removed at pleasure. Those of Desault, which are of silver with a steel point, are made so as to diminish in volume from their cutting extremity to that which is to support the action of the finger, in order that they may be extracted without bringing them back again through the same track that they have entered, and without passing their cutting portion a second time through the flesh. These are the ones which in France at least have been almost universally adopted. We cannot see indeed that there is any objection to them unless it be that ordinary pins, such as are everywhere met with, may notwithstanding be wholly substituted for them, if before inserting them we take the precaution to sharpen their point a little, in order to flatten it by rubbing it against a tile in the apartment, or some stone vase or any hard stone.

e. The *semilunar incisions*, with their concavity forwards, which Celsus made on the inside of the cheeks, and which Guillemeau, Thevenin, and Manget, made on the outside, and the dissection and gashes on the posterior surface of the lip which Franco, (*Traité des Hernies, &c.*, p. 460, 1561,) J. Fabricius and D. Scacchi recommended in order to favor the approximation of the borders of harelip are no longer to be mentioned in simple cases, except to expose their absurdity and barbarity. I have mentioned in the chapter on anaplasty under what circumstances they may be useful. But this does not apply to the suggestion of preparing beforehand the parts which are to be approximated. In place of the pincers of Fabricius, &c., V. D. Haar, and after him Arnemann and Knackstedt of Petersburg, have recommended a bandage which, after having been employed for a week or two, is capable of approximating towards the median line the points which it is important for the operator to bring

into contact. It rarely happens, however, that the moderns consider themselves obliged to follow out this indication, inasmuch as they know that an ordinary uniting bandage would perfectly attain the same object. Unless the separation should be extreme, the immediate approximation of the sides of the wound is usually attended with but very little difficulty.

f. Surgeons at different epochs, apprehending that in spite of the suture the parts might ultimately retract, have endeavored to find some means of obviating this inconvenience; from whence is derived that multitude of dressings with which the science is overcharged, and that combination of the dry suture or *bandages* with the bloody suture. In this respect Dionis is the one who appears to have given the example. He placed an agglutinating plaster in front of his twisted sutures, and supported the whole by means of a bandage with four tails. La Charrière considered that by means of a circle of steel, which surrounded the head, and by graduated compresses which he placed upon the cheeks, success would be unavoidable. It was for the purpose of replacing his bandage, as modified since in various ways by Quesnay, Heister, Henkel, Koenig, Stuckelberger, Eckhold, &c., that Enaux and Valentin devised those which bear their name, and that M. Roux (*Méd. Opér.*, t. I., p. 451) associated with the ordinary suture a square piece of adhesive plaster, provided with nooses of thread on each cheek, but which the bandage of Louis or that of Desault have caused to be entirely abandoned.

II. *Operative Process.*—As to the rest, the following is the mode to be adopted in the operation: the different articles are composed of an erigne, a claw or dissecting forceps, a pair of harelip scissors, three, four or six prepared needles, a simple waxed thread two to three feet long, a second thread composed of two to three strands and twice as long as the first, small rolls of adhesive plaster or linen to place under the extremities of the needles, a thin plumasseau of lint besmeared with cerate, two compresses somewhat longer than broad, and folded six or eight double, to be applied upon the cheeks, a band an inch wide and rolled into two heads and sufficiently long to make four or five turns round the head, the sling bandage, strips of adhesive plaster in case we do not wish to employ a bandage, a playing card, and a straight bistoury when we do not wish to operate with the scissors.

a. *First stage.*—The patient being placed upon a chair in a well lighted apartment, is to have his head steadily supported by an assistant, who is to prepare himself in such manner as to be enabled to compress at the same time the external maxillary arteries below and in front of the masseter, to push forward the cheeks towards the median line, and to hold the lip if it is necessary, while the operator excises it. A second assistant is charged with handing all the different articles according as they are required. The surgeon being seated or standing up in front of the patient, passes a thread through the lower left angle of the division, as Koenig recommended, should he not prefer to introduce there a pin or hook it up with an erigne, as M. Roux does, or more simply make use of the tooth forceps as I do, or of the forefinger and thumb, in order to secure it with the left hand. The scissors being held in the other hand, are immediately

carried to two or three lines higher than the upper angle of the fissure, and separate the whole rounded portion with a single cut, if possible, encroaching even a little upon the sound tissues in such manner as to make a fresh, straight, regular, and neatly incised wound. On the other side he stretches the lip itself by embracing or drawing upon it with the thumb and forefinger placed a little outside of the border which is to be excised. The scissors, which are to be directed as before, are to be raised at their point as high as the upper extremity of the first wound, and even a little higher, in order that the two strips which have been isolated, and which, by their reunion, represent a V reversed, may be found at the moment free from every adhesion, even at their nasal angle. Nevertheless, if at this point a pedicle should remain, it should be divided by a third cut of the scissors, and as high up as possible. Otherwise this part of the wound, being too much rounded, would not allow of an exact coaptation without difficulty.

*b. Second stage.*—In order to insert the suture, the operator again seizes the right side of the solution of continuity with the forefinger and thumb of the left hand. With the right hand he directs the point of a first needle upon the skin, at half a line above the vermillion border of the lip, and at three lines external [to the wound]; plunges it in somewhat obliquely from below upwards, from before backwards, and from the skin towards the mouth, in order that in traversing the tissues it may come out at the union of the two anterior thirds with the posterior third of the bleeding surface; then changes its direction; pushes it through the other lip, from behind forwards, from above downwards, and from within outwards, in such a manner that its place of entrance and exit may be as accurately upon the same line as possible, and that in its whole track it shall have made a slight curve whose convexity is directed slightly backwards and upwards. Its two extremities are immediately encircled by the simple noose of thread, prepared for this purpose, and which enables the assistant, who is charged with this, to stretch in a proper manner the whole extent of the lip, while the surgeon inserts the second needle. The latter needle, if we want but two of them, should be inserted at an equal distance from the first and the upper angle of the harelip. There is no necessity, as with the other needle, of making it describe a curve or traverse separately through the two halves of the division. It is therefore pushed in transversely with the right hand, while the fingers of the left hand hold the two borders of the wound in coaptation, taking care nevertheless to make it enter and come out upon the skin at about three lines from the solution of continuity. In making use of fine pins, of insect pins for example, I have often employed as many as five with advantage. The middle part of the double thread seizes the last immediately after. Conducted by the two hands the two halves of this thread envelop it afterwards with cross turns in figure of 8, are then brought forward by forming an X under the adjoining needle, which is surrounded in the same manner, and thus in succession from one to the other, until the thread is exhausted or the whole wound is concealed by the figures of 8 and X which it has furnished. To terminate this

operation its two ends are rolled up, in order to be fastened under the head or point of the upper needle.

c. *Third stage.*—The first thread having become useless is divided by the surgeon, who then places small protecting rouleaux between the integuments and the pins, together with the plumasseau of lint, and the adhesive plaster or bandage, if he has concluded to make use of them. In this case he applies the middle of the bandage on the middle of the forehead; carries the two heads under the occiput, crosses them and changes hands, brings them back below the ears, and upon the square compresses which the assistant maintains in front of the masseter muscles; arrives on the sides of the nose; makes a slit in one of the heads of this bandage, opposite to the wound, in order to insert the other there, and to cross them with greater facility; carries them back above the nape in order to cross them a second time, and to terminate by circular turns around the cranium. The sling bandage, which is to fasten the whole, is first applied to the chin by its middle portion. The two lower heads are then raised up in front of the ears, over the cheek compresses, and as high as the vertex, where they are attached. The two anterior heads which remain are to be carried backwards in order to cross at the occiput, and to be brought forward upon the forehead. At present, however, I dispense with every kind of bandage and find I can get along very well.

III. *Subsequent treatment.*—This being done, the patient is to be replaced in his bed, where he is to remain at rest without speaking or attempting the slightest movement of the jaws, during the space of three or four days. Broths and very light soups, weak wine and water, or any ptisan whatever, constitute his whole diet. At the expiration of three days, if everything goes on well, the upper needle may be removed; and on the fourth day that also below. The mass of nooses of thread, glued to the skin, and left in place for one or two days longer, enable the cicatrix to gradually consolidate. When the front part of the lip is entirely freed of them, we may substitute adhesive plaster, if any apprehension exists that the reunion is not yet sufficiently firm. About the ninth or tenth day the cure is usually complete. There will be no impropriety in beginning on the fourth to allow of soups somewhat more substantial, and to permit the patient to get up and walk. When the needles are fine and in greater number, they may be withdrawn much sooner, beginning on the day after the operation. They have not, to the same extent as the others, the inconvenience of ulcerating and of mortifying the tissues which surround them.

IV. *Remarks.*—Before commencing the operation it is almost always necessary to divide the *frenum* of the upper lip. It can scarcely be dispensed with when we make use of the scissors, except in cases in which the fissure has but little depth and is situated outside of the median line. The bistoury forms no exception to this remark unless we dispense with giving it a support. When using this latter instrument we place, after the frenum has been divided, a card as high up as possible between the maxillary bone and the lip. After having fixed, by embracing it at its lower angle, the left border of the harelip upon this card, we direct the point of the instru-

ment, held as a writing pen, to the spot where the incision is to begin, in order to plunge it in perpendicularly, then gradually to depress its handle and to cut with a single stroke the whole extent of the fleshy border included between the cutting edge of this instrument and the card which hinders it from penetrating into the mouth. In order to excise the other border the surgeon seizes hold of the lip outside of the division, unless he should be sufficiently practised to do with the left hand what he has done on the opposite side with the right hand; carries in every case the point of the bistoury to the upper angle of the first wound, and terminates the incision moreover on this side in the same manner as in the other. The compress which Lavauguyon placed between the lip and the gum, in order to prevent the *adhesions* of this last, already rejected by Le Dran as useless if not dangerous, and again proposed by Heuermann, is no longer employed at the present day by any person, any more than is the piece of sheet lead advised for the same purpose by Eckholdt. Cases where the lip has been separated to a great extent from the maxillary bone are the only ones which would allow of its being thought of. De la Faye and Mursinna, who recommend that we should commence with the highest needle, doubtless forgot that in that event the two labial extremities of the division incur the risk of not continuing upon the same line. De la Faye himself was obliged afterwards to exsect the deformed tubercle, which was the result of it in one of his patients. Without conforming entirely to the precept of Le Dran, or plunging the lower needle into the vermillion border of the lip, we ought however to recollect that at the distance of more than a line above it the reunion might not be complete and might leave a small notch below. If it did not penetrate nearly as far as to the buccal surface of the organ, the agglutination would be effected only in front. A groove or gutter of greater or less depth would continue behind, and render the success of the operation imperfect. The bleeding surfaces not being in accurate contact, nor pressed together in a uniform manner throughout their whole thickness, would favor hemorrhage. It is readily perceived, on the other hand, that there would be a disadvantage in traversing the two halves of the lip through and through. In making the needle describe an arc the object is to depress the tissues a little more upon the median line than upon the sides, in order thereby to reproduce as much as possible the tubercle or small projection which should naturally exist there. The curved or flexible needles would be incapable of fulfilling this indication, which has been particularly recommended by A. Dubois (Heurtault, *Thèse*, Paris, 1811.) Although, as a general rule, we should *excise* rather a little *more than less* and prolong the wound, as B. Bell has pointed out, as high up nearly as the nose even when the notch has but little depth, it will be found sufficient however, by removing the whole red portion or cicatrized border, to transform the harelip into a fresh wound with loss of substance, of an exact triangular shape, and the edges of which present in every part the same degree of thickness. It would however, perhaps, be well to make each border of the division concave, as recommended by M. Husson, the son, (*Thèse*, No. 185, Paris, 1836,) should it appear that the reproduction of the middle tubercle of the lip would without this expedient be attended

with too much difficulty. If the effusion of blood, which at first comes out with considerable force from the coronary artery, should not yield to pressure made on the facial artery on the border of the jaw, the assistant in order to arrest it would only have to pinch the corresponding half of the lip. Neither the ligature nor caustic are ever indispensable in these cases. As soon as the two bleeding borders are brought together the hemorrhage ceases ; their want of contact in one point or another, or some unforeseen accident, could alone enable it to continue. The surgeon moreover would be censurable not to pay attention to this subject during the first hours, especially in children. The blood, in fact, in place of being expelled outside, is swallowed by them in proportion as it oozes into the mouth, and as Platner says, the hemorrhage in this manner may go on to some degree unperceived, or may even, as in the examples given by J. L. Petit and Bichat, proceed to such extent as to cause death. Before applying the bandage it is well to *cover the head* with a cotton cap, drawn down so as to prevent its being disturbed without some difficulty ; also to comb out the hair well and to besmear it with mercurial or veratrum (cevadille) ointment, in order to prevent the necessity of scratching, which young patients could not resist should vermin make their appearance on the cranium.

The two compresses, which are placed in front of the ears, possess the triple advantage of crowding the tissues forward, rendering the bandage more supportable to the other parts of the face, and preventing the movement of the cheeks. Instead of making a slit in one of the heads of the bandage, to pass one within the other at the point of the wound, we may, if necessary, limit ourselves to crossing them carefully below the nose. The important point is, that they should not make any folds, and that the pressure which they exert should be as uniform as it is gentle. Louis cut the free extremity of his bandage into three strips of from fifteen to eighteen inches long, and also made in them three button-holes at nearly two feet beyond, with the view of effecting a more uniform and firm crossing opposite to the solution of continuity. Desault, on the contrary, rolled up his only in a single head, fixed it by a circular turn round the cranium, and when he had brought it as far as to the labial angle on one side, before carrying it back to the occiput, he strongly drew towards him all the soft parts of the opposite side, by means of the cheek compress, which without that precaution would have incurred the risk of being pushed backwards, contrary to the intention of the operator. But the ordinary bandage, whatever Bichat may say of it, has fewer inconveniences, while at the same time it retains the same simplicity as that of Desault. The sling bandage generally used is a very useful auxiliary in certain cases. By resisting the separation of the jaws, it favors the action of the suture. When we recollect that in a patient of Garengeot, a burst of laughter was sufficient to disunite the wound ; and that a young boy operated upon by De la Faye experienced the same accident in consequence of his sneezing, from a person taking a pinch of snuff near him, we may well be permitted to do all in our power to prevent the slightest movement of the mouth. In withdrawing the ordinary needles not until the expiration of five or six days, as is recommended by Garen-

geot, after having removed the threads, we have reason to apprehend that we may transform the track of the wound into a suppurating ulcer, and retard the ultimate cure. If they are taken away on the day after, or the day after that, as Le Dran assures us he has done without any inconvenience, it is almost certain that in the majority of cases the reunion will not be maintained. Moreover, not having yet had time to excite suppuration around them, their extraction then would not always be unattended with difficulty. In every case, when we are about to withdraw them, it is advisable to grease with butter, oil, or cerate, the extremity which is to pass through the tissues in coming out, that is to say, the point for the needles which have heads, and the blunt extremity for the others. They must be drawn out gently, and without shaking, turning them upon their axis as soon as any resistance is made, and constantly furnishing to the corresponding side of the lip, while we are removing them, a point d'appui with the forefinger of one hand. A small quantity of lint spread with cerate and some lotions of vegeto-mineral water are all that is required for the subsequent cure of their punctures.

B. *Complicated Harelip*.—I. In the *double harelip* two different conditions may be encountered if the vault of the palate does not participate in the deformity. Sometimes the two fissures are only separated by a narrow and slightly projecting tubercle, which must be removed by comprising it in the angle of reunion of the two excisions, which have been made in order to raw the ordinary harelip. Sometimes, on the contrary, this tubercle is too large to be destroyed without inconvenience. In such cases, whether it descend or not down to a level with the border of the lips, it is better to excise its two sides. We then pass through it all the needles in the first case, and the highest, or two highest only in the second, in order to attach it to the middle of the suture. This method, which is the most ancient of all, is at the same time the most simple, prompt and certain. If, however, the middle flap is very wide at its base, we may, after having embraced it at its summit with a first needle, traverse it with one or two others on each side, as M. Gensoul does, and as I have done in one instance. After the cure the cicatrix resembles a capital Y, and represents also the track of the naso-labial columna. It is scarcely perceptible to the patient that he has been made to undergo two operations in place of one. He soon recovers, and the consecutive inflammation is neither more nor less active than that which follows simple harelip. The idea, therefore, advanced by Louis or by Heister, of operating on one side only at first, and waiting for its complete cicatrization before proceeding to the other, though imitated since by some practitioners, has not been and ought not to be adopted.

II. The deformity, however, is sometimes much more complicated. It was so extensive in a worker in gold wire, mentioned by Covillard, (*Obs. Iatro-Chirurg.*, p. 86, obs. 29, 1639,) that there was a separation of two fingers' breadth on each side. *The portion of maxillary bone* which supports the middle flap, *makes*, in certain cases, a considerable projection forward. Like Dupuytren, (*Gaz. Méd. de Paris*, 1833, p. 6,) I have in such cases seen the raised up lobule continuous with the end of the nose, and projecting directly

forward. Whether it coexists or not with a double division of the palatine vault, we must attend to the complication before proceeding to the rest of the operation. Franco (*Traité des Hernies, &c.*, chap. 120, 121, p. 460 et suiv.) at first, then D. Ludovic, and afterwards Chopart and many of the moderns, have proposed to remove it either with the small saw or cutting pliers, or gouge and mallet, after having isolated the soft parts from it. Desault having remarked that this excision leaves a void behind the lip, which then no longer finds in this direction a convenient support; that there may, moreover, result from it so considerable a contraction of the superior dental arcade, that it ultimately becomes incased in the inferior dental arcade during mastication, an example of which he cites; proposed to preserve the osseous projection, and to limit himself to pushing it backwards by applying upon the anterior surface of the tubercle which it sustains a moderate degree of pressure during the space of two or three weeks. This method with him succeeded perfectly in many instances. Verdier and other surgeons have since obtained the same advantageous results from it. We should therefore adopt it in cases of simple deviations of the teeth the most approximated to the median line. To extract the projecting teeth after the manner of Gérard, and as most modern operators recommend, is an extreme remedy, which must not be decided upon until after having fruitlessly endeavored to restore them to their place, either by compression or by drawing them back towards the mouth by means of metallic wires fixed to the lateral teeth. Finally, it rarely happens that by means of precautions judiciously applied, and a little patience, that we do not succeed, in young subjects in causing these osseous projections to disappear without destroying anything. If the teeth, or the bone which encloses them, do not present in front either irregularities or angles too acute, the operation, nevertheless, may ultimately succeed. The reunion having been once effected, the pressure of the lip upon these parts suffices to give to them again, at the expiration of a greater or less period of time, their proper direction and position. In certain cases there would be an advantage also in proceeding after the manner of M. Gensoul, in a female in whom the intermaxillary projection, containing incisor teeth, had acquired a position almost horizontal, and after the manner of M. Champion (communicated by the author) in another case. M. Gensoul, after having dissected and reversed towards the nose the flap of soft parts, and removed the four incisors, seized the projecting portion of the bone with a strong pair of forceps, as if for the purpose of breaking it off, and succeeded in this manner in giving it a perpendicular direction; then depressed, in the same manner, the right canine tooth: afterwards excised the four borders of the double harelip, inserted the twisted suture into it, and maintained the whole by means of a bandage. This young patient, who was thirteen years of age, was perfectly cured. The bone thus consolidated, as well as the canine tooth, in the new position which had been given to it, and its border, which reached to the line of the molar teeth, became sufficiently firm to serve as a point d'appui to the inferior incisors during mastication. M. Champion, who dispensed with extracting the teeth, nevertheless succeeded perfectly well. In a newly born infant which I operated

upon with M. Rivaillé, in 1837, I found that the median point, which sometimes makes an appendage to the lobule of the nose, had to be elevated posteriorly, in order to reproduce the nasal subseptum, and not depressed into the fissure of the lip.

III. The *simple fissure*, or that in the form of a capital Y, in the *maxillary vault*, to remedy which the ancients supposed nothing could be done, and which moreover prevented them from attempting to treat the harelip with which it is so often complicated, presents no obstacle whatever to the success of the operation, and requires in this respect, unless there should be too great a separation, no special modification in the process.

After the suture, the borders gradually approximate, and it sometimes, of itself, ultimately disappears completely, as is proved by examples which are already found in Roonhuysen, Sharp, De la Faye, Levret, (*Art. des Accouch.*, 3d edit., p. 252,) Quesnay, Richter, B. Bell, and Lapeyronie. In the instance noted by Gérard, this fissure, which was not less than a finger's breadth in width, closed up at the expiration of two years. Some few weeks were sufficient to effect this in a patient of Desault, and M. Roux mentions a child three years of age in whom scarcely any traces of a similar separation were observable at the expiration of the fifth month. The moderate but regular and constant pressure which the lip, whose continuity has just been re-established, exercises upon the whole external surface of the bones, is the cause of this truly remarkable phenomenon. Nevertheless, if it should be too tardy in being accomplished, either in consequence of the long standing of the disease or because of the very considerable chasm which the two maxillary bones leave between them, I do not see why we might not endeavor to favor it by means of compressing bandages either below the cheek-bone and on the skin, after the recommendation of Jourdain, (*Mal. de la Bouche*, t. II., p. 449,) and of Levret, (*Anc. Journ. de Méd.*, t. LXXXIX., p. 543, 40, 772,) though censured by Richter, but justified by Leblanc, (*Précis d'Opérat.*, t. I., p. 25,) or directly upon the alveolo-dental arcades themselves, as was done by me in 1825, or by embracing almost the entire head with Dent's bandage, or the ribbon dressing of Terras. There would be moreover a great number of modes of effecting this; and the object being once clearly ascertained, each surgeon would be enabled to devise the most suitable course to effect it. As in these different cases the lip has posteriorly but a very unequal point d'appui, and that any extraneous plate kept behind its posterior surface would have the serious inconvenience of irritating the parts, the bandage should be arranged in such manner that it would not exercise any great degree of pressure in front. It is unnecessary to add that the needles cannot be withdrawn with any degree of safety until the fourth or fifth day.

IV. *The most proper age for the operation.*—Another point still remains to be examined. Is it prudent to operate for harelip in the first months of infancy, or is it better to wait until the age of reason? This last opinion, advocated by Dionis and most of the surgeons of the 18th century, is almost exclusively adopted at the present day among us. The reason given for it is, that the young infant, incapable of assisting in the precautions that such an operation requires, cries

and becomes agitated and abandons himself to the most violent movements as soon as he is attacked. The mere sight of the surgeon or those who have approached him during the cheiloplasty, are sufficient to excite his terror and to throw him into a state of emotion. The slight degree of consistence and the little resistance of the tissues to the knife, (*séabilité*), occasion the points of sutures to be torn out upon the slightest degree of traction. The tongue, habituated to the efforts of suction, constantly presents itself between the lips, and more or less interferes with the reunion. The rigid diet which is necessary for several days sometimes produces, says Lassus, an emaciation so rapid that, at the expiration of 24 or 48 hours, the cheeks of the infant become flabby and all the portions of the suture greatly relaxed. Finally, it is a matter of very little consequence to the patient whether he is cured a little sooner or a little later, so long as he has not yet arrived at the period of talking. After the third or fourth year, however, the difficulty which he experiences in giving utterance to his thoughts, the railleries of his little comrades, and the consciousness of his own infirmity, naturally create in his mind a desire to be relieved of it. Then too, reasoning or entreaty or menace, have already begun to have a certain influence over him. He may then support the diet, and the density of the tissues is much greater.

To these arguments Busch, of Strasbourg, who with Roonhuysen, Sharp, Le Dran and Heister, had adopted the opposite opinion, replies, that we may prevent the cries and movements of the child by interrupting his sleep for several days beforehand, and by administering to him preparations of opium a short time before operating upon him, in order that he may become calm, and may sleep immediately after; that a child of three, six and even ten years of age, is often more difficult to restrain than if he was still at the breast; that the latter, entirely unconscious of fear, is affected only by real pain or wants, whereas the other recoils even at the suggestion of the slightest degree of suffering, and in reality attaches but very little importance to the results of the operation which is about to be performed upon him; that if in the first case the tissues are more easily divided and lacerated, this is compensated by their being better disposed to favor the completion of the agglutination with promptitude and certainty. I will add that when the suture is adjusted, the movements required for the introduction of a small quantity of milk or broth present but a very slight obstacle to the cure; while up to that period the harelip has scarcely permitted the little patient to become accustomed to sucking. The prolonged duration of the disease involves many more inconveniences than would seem to be imagined. It interferes with the development of the intellectual faculties by the impediment which it occasions to the pronunciation, and therefore to the employment of the ordinary means for education. When the separation of the vault of the palate is complicated with it, the longer we wait, the more the bones become separated apart, in consequence of the want of resistance from without. In this last case, sucking and even deglutition itself may be rendered extremely difficult, and death by inanition become unavoidable; examples of which exist. Moreover, in opposition to the arguments of Lassus, Sabatier, M. Roux, &c., we may oppose the daily practice of the Eng-

lish surgeons, the successful result obtained by Muys, RoonhuySEN, Le Dran, Bell, Busch and Bonfils, (*Ephem. Méd. de Montpelier*, t. VI.—*Gaz. Méd. de Paris*, 1832,) on infants only some days or a few weeks or months old, and the three instances which have been published by M. Delmas, (*Ibid.*) It is moreover during the first months, and as near as possible to the period of the birth of the infant, that I would operate, unless I should think proper to wait till the termination of its first year of its infancy. As soon as the second year arrives, the patient having become more intractable, does not therefore possess more reason, and the inconveniences of his position, which are no longer of a nature to jeopardize his life, allow us to temporize for three or four years longer; thus I would choose the six first months of infancy, or from ten to fifteen years, as the proper time of operating for harelip; that is to say, I would rather recommend to those who have not been operated on in the first period, that they should wait for the second. If, however, the borders of the division were separated so wide apartas to render it almost impossible to bring them into contact, it would be useless to attempt the suture. I have seen it under such circumstances attempted without success in 1822, at the hospital of St. Louis on an infant about a month old; but it is doubtful if it would have succeeded better at a later period. Why not commence in serious cases by diminishing the intermaxillary fissure by means of a good compressor, similar to the spring that M. Pointe, of Lyon, (*Journ. Univ. des Scienc. Méd.*, Juillet, 1825,) in 1825, and M. Maunoir, of Geneva, (*Clin. des Hôpit.*, t. III., p. 48—*Gaz. Méd.*, t. I., p. 229,) a little later found to answer so satisfactorily? Why not separate the posterior surface of the two halves of lip from the bones as far as to the neighborhood of the cheek, in order afterwards to bring them together with greater facility, in the manner as had already been recommended by Franco, J. Fabricius, Horn, Nuck, Roonhysen, &c.? In whatever manner the surgeon moreover proceeds, he should before taking the instrument in hand duly reflect, that notwithstanding all its simplicity, the operation for harelip requires skill and dexterity; that if he does not properly appreciate all the different stages of the operation, he will necessarily perform it badly, and to the same extent that it will confer honor upon him when he performs it in the most skilful manner, to the same degree will it be discreditable to him when he only succeeds imperfectly.

### § II.—Cancer of the Lips.

All kinds of cancerous tumors and degenerescences are neither more nor less capable of being cured in the lips than elsewhere. The ablation, when it is practicable, is almost the only remedy. It is doubtful, except in a few slight cases, if caustics, which are still employed successfully it is said by MM. Fleury, Patrix, (*Emploie de la Pâte Arsenicale*, 1816, in 8vo,) Hellmond, (*Bull. de FéruSS.*, t. VI., No. 74; t. IX., No. 244,) Haime, (*Precis Méd. d'Indre et Loire*, 3e trimestre, 1817.) Chelius, (*Bull. de Fér.*, t. XIV., p. 79,) Magliari, (*Ibid.*, t. XIX., p. 284.) Heyfelder, (*Ibid.*, t. XII., p. 63,) &c., can be substituted for it, even though we should make use of the zinc paste eulogized by M. Conquoin, (*Bull. de Thérapeut.*, t. VII., p. 243, 375,) or the Eau Regale or chloruret of gold made trial of by

M. Récamier, (*Ibid.*, t. VIII., p. 300.) I have shown in another article what course is to be adopted when the maxillary bone itself is affected; I do not therefore intend, on the present occasion, to treat of any other matter than what concerns the soft parts. When the disease occupies only a small extent of the labial border, or that it extends more in a vertical than a transverse direction, the operation, which is as simple as it is easy, may be performed in two ways.

A. *Excision in V.*—The first consists in circumscribing the cancer by two oblique incisions in a triangular flap or sort of V, the base of which should correspond to the free border of the lip. The patient and the assistant are arranged in the same manner as for harelip. The surgeon embraces the morbid tubercle with the thumb and forefinger of one hand; while with a good pair of scissors or straight bistoury in the other, he forms his flap, taking care to cut into the sound parts and from the buccal opening to the point of the V, which he proposes to excise. The excision being now completed, nothing remains but to approximate the borders of the wound produced by it, to maintain it united by means of the suture, and to treat it in the manner of harelip. This method, the only one which has been for a long time followed, is applicable to the upper as well as to the lower lip, to its middle portion as well as to the angles of the mouth, and ought to be preferred so long as it does not become necessary that there should be any considerable loss of substance, or that we should destroy more than half, for example, of one of the lips.

B. *Semilunar excision.*—The other mode is still more simple in appearance. It resolves itself into a simple semilunar incision, which includes in its concavity all the diseased tissues, is made with the bistoury, or the scissors curved flatwise, and leaves as its result only a notch of greater or less depth. It is adapted only to the lower lip and when the disease extends less in a vertical than a transverse direction. Some modern surgeons have erroneously claimed the first suggestion of this process. It was in use at the time of Le Dran, and Louis mentions a patient who had been operated upon by this mode, and in whom it was said the lip had grown out again, (*etait repoussée.*) Camper (*Prix de l'Acad. de Chir.*, t. IV., p. 585, 1819,) also gave it out as his invention. We find it even in Fabricius ab Aquapendente, who remarks very justly that we may in this manner remove a large portion of the lip, and that the deformity which results from it is infinitely less than one would be induced to suppose. However this may be, it was almost entirely forgotten until M. Richerand, A. Dubois, and Dupuytren revived it into credit among us. Two circumstances combine, after excision performed in this manner, to favor the elevation of the wound towards the dental arcade. These are the pressure outwards upon the sound tissues produced by the development of cancer, and secondly the gradual tractions which, at a subsequent period, the cicatrix exercises upon the integuments of the chin or even upon the upper part of the neck. It has been seen, in fact, that the surrounding soft parts, in persons who had in this manner lost the lip from one commissure to the other, and in the whole extent of its breadth, became elevated and sufficiently convergent towards the mouth to reach as far as to the

root of the teeth and even still higher. In the most fortunate cases the mucous membrane of the arch of the gums becomes united to the corresponding portion of the wound, and yielding to the cutaneous tissue which tends to draw it outwardly is reversed forwards, as if in order to furnish to the border of the new lip the vermillion pellicle which naturally belongs to it.

C. *Hem.*—This process however is not as good as the first; when using this the cure is always less prompt and the deformity always more perceptible. Consequently it should be reserved for exceptional cases. An improvement which might be made in it, and which M. Serre has already employed in practice, would consist in immediately uniting the mucous border with the cutaneous border of the wound, or as I have successfully done, bring it down in form of a hem by means of the simple or whip suture. We should in this manner procure in three days, a cicatrix more pliant and neat than that which we could get from the ancient mode in a month.

D. Under the most *unfortunate circumstances*, a greater or less extent of the jaw remains exposed after a removal of cancer of the lip. Speech then becomes imperfect, and the patient constantly losing his saliva, is placed under the necessity of wearing a metallic apparatus to the chin furnished with a sponge. Fortunately however at the present day, we are in possession of other modes of avoiding this inconvenience. (See Cheiloplasty.) It is important however, to remove in good season and freely, cancerous tumors of the lips; otherwise they repullulate in the neighborhood and below the jaw with frightful rapidity. A peasant of a robust appearance, in whom I removed one which did not exceed in size a small nut, died at the expiration of eight days with hundreds of cerebriform granules in the liver!

### § III.—*Eversion (Reversion) and Mucous Bourrelet.*

The lumps, and especially the species of red-colored ridge which many persons have on the internal surface of the free border of the lips, is a deformity which has been hitherto paid very little attention to in surgery. They are sometimes seen in the upper lip, which is most predisposed to them, sometimes upon the lower lip, and occasionally in both lips at once. In certain cases, under the form of one or many tubercles that are scarcely perceptible, at other times under the aspect of a transverse projection, which strongly pushes the lip towards the skin as soon as the patient attempts to laugh or speak. Though it is usually a congenital defect, it sometimes occurs accidentally, especially in persons who play the horn or are obliged to cry with great force. Their presence has nothing dangerous and involves no other inconvenience than that of rendering the countenance somewhat less agreeable. Also, most of those who are affected with them, have them all their lives without ever thinking of getting rid of them. Nevertheless in certain classes of persons they become embarrassing, as in hunters, musicians and orators for example. Instances of this kind are seen in the two patients who were operated on in 1829, by M. Roux and Boyer. They are, however, cured with great facility. They are to be excised either with the

scissors curved on the flat side or with the ordinary bistoury. While an assistant stretches the lip at its two angles, and exposes its inner surface to view, the surgeon seizes hold of as much of the vegetation as possible by means of a good pair of forceps placed transversely, raises it up a little, and afterwards proceeds as in the excision of the bourrelet of the conjunctiva in ectropion. Numerous cases from different authors, or those mentioned in the lessons of Dupuytren, show that at the end of a week or two the cure is complete, and that the deformity which has been thus treated, has entirely disappeared. Nevertheless, as there are in this part under the elongated tissues numerous hypertrophied mucous glands, which glands and follicles it is necessary to remove, and as I have seen the wound in certain persons take on a bad aspect, and require nearly three weeks or a month to cicatrize, I have adopted another method. Having seized the mucous fold with a pair of forceps, I pass through its root or base near the muscular tissue, three or four threads which I leave there. I then immediately excise the bourrelet near these threads, after which I have nothing more to do than to knot the points of the suture, which may be removed on the second or third day. The same operation would be equally applicable without doubt, to the eversion of the lips produced from any other cause, as for example, by bridles or ancient cicatrices, so true it is that this condition of the mouth has the greatest degree of analogy to ectropion or eversion of the eyelids, and that it is susceptible of the same surgical remedies.

#### § IV.—*Hypertrophy of the Lips.*

The thickening of the upper lip, which may be considered almost a natural result in scrofulous subjects, may exist to such extent as to constitute a serious disease if not a disagreeable deformity. In certain cases the totality of the lip acquires so great a degree of development that its posterior surface ultimately becomes reversed downwards and its free border directly forwards. So long as there is a morbid action going on and that the hypertrophy is not positively established and not reduced to the condition of a simple defect of conformation, we should confine ourselves to internal or external treatment and to the proper general or topical remedies. But when all the resources indicated by a sound therapeutic have been employed in vain, and that the affection has become purely local, there is no other than the cutting instrument which can destroy it, unless we should be disposed to make trial of compression and caustics. The operation which is proposed for the relief of the patient was suggested, in 1826, by M. Paillard, (*Journ. de Progrès*, t. III., p. 213.) who performed it in three instances with entire success, and who gives three other examples of a fortunate issue obtained in the same manner, by MM. Marjolin and Belmas. It consists in un-doubling the lip and reducing it to its normal dimensions by excising a layer from its tissue of greater or less degree of thickness. The assistant charged with supporting and holding the head of the patient back against his chest, is also made to stretch the part and cause it to project outwards by seizing it at the left commissure with the forefinger and thumb of the corresponding hand. The operator placed in front

and a little to the right seizes hold of the other commissure, then with a bistoury in his right hand makes, from one labial angle to the other, and perpendicularly on the border of the diseased lip itself, an incision which is slightly somewhat more approximated to the mucous membrane at its extremities than at its middle; in this manner circumscribes every thing which it is his intention to remove; immediately embraces this flap with the forceps and dissects it rapidly with the same bistoury from the free to the adherent border, and from the left to the right extremity of the part, down to a level with the sound tissues; endeavors to give it all the breadth and thickness required, while taking care to approximate it gradually to the mucous coat before terminating the excision near the alveolo-labial groove with the last cut of the bistoury or a good pair of scissors. The wound which results from it sometimes bleeds copiously, though in general it yields with facility. No kind of dressing is necessary, inasmuch as the traumatic surface, from being continually lubricated by the saliva, becomes rapidly cleansed. In cicatrizing it reacts upon the integuments, gradually brings them forward, or even tends to incline them downwards, and in cases of complete cure, the lip not only returns to its natural thickness, but also to its normal direction.

### § V.—*Various Tumors.*

M. D. Lasserve, by excising in this manner from the upper lip, was enabled to remove an enormous fibrous tumor. A boy aged fifteen years was brought to me from Vaugirard by his father, in 1836, to the hospital of La Charité, for an elephantine tumor, which he had had upon his upper lip for the space of three years. This tumor, which was badly defined, half the size of an egg and indolent, occupied the entire thickness of the lip and did not, after having been removed by the V excision, return again in the manner of cancerous tumors. Sebaceous and mucous cysts, those that are serous, and all the descriptions of tumors which I have elsewhere described, are quite frequently met with on the lip. An erectile tumor was extirpated from this part with entire success by M. Pl. Portal, (*Clin. Chir. &c.*, pp. 139, 144.) Under the chapter on *erectile tumors* I have described the number of processes that have been adopted for those of the lips. M. Pl. Portal also states that he successfully extirpated one that was situated upon the chin.

### § VI.—*Atresia and Contraction of the Anterior Opening of the Mouth.*

Boyer, who says that he never saw an instance of imperforation of the mouth, was doubtless unaware of the fact, that Haller had mentioned several instances in the human species and in animals; that Monro had noticed this imperforation in young pigs, and that Verdier (*Abrégé d'Anat.*, t. II., p. 124,) states he had seen an instance in a dog. This last author also relates, on the authority of Gregoire, an instance of a newly born infant who had neither mouth nor nostrils, though it was born alive. Schenckius, (*Planque, Bibl. de Méd.*, t. I., p. 305, in 12, art. *Accouch.*) had already mentioned that he had met with

infants in whom he was obliged to lay open the mouth, and Desgenettes (*Gaz. Salut.*, 1792, p. 95,) states that he had seen a seven months' foetus in which the mouth was imperforate. It is shewn, therefore, by these facts, that imperforation of the mouth may be congenital. Other observations prove that it may also take place after birth. G. Horstius (Turner, *Mal. de la Peau.*, t. I., p. 120,) relates that in a miller, the lips, after having been excoriated, became glued together. A small hole which had previously allowed of the introduction of aliment into the mouth, by means of a funnel, itself ultimately closed up, so that the poor patient starved to death. Though the entire obliteration of the mouth may be infrequent, it is not so with simple contraction, or coarctation of the lips. This contraction, which, like imperforation, may be either acquired or congenital, may result, moreover, from various descriptions of diseases. A newly born infant mentioned by Demarque, (*Op. cit.*, pp. 449, 450,) had the opening of the mouth so small that it was scarcely possible to introduce a pea into it. Another individual mentioned by the same practitioner, had the mouth contracted to the extent of a finger's breadth on each side, in consequence of small pox. Demarque (*Traité des Bandages*, p. 447,) mentions also a woman and child in whom the opening of the mouth was in this manner almost entirely closed, in consequence of burns. When the imperforation is complete, as in the patient of Buchner, (Planque, *Bibl. de Méd.*, t. XVI., p. 166,) or in that of Percy, (*Mémoire sur les Ciseaux*, § 5, p. 70,) we must in the first place incise in the direction of the natural opening, and upon the part of the cicatrix which appears to be the thinnest. As soon as the bistoury has passed into the mouth, it is well to replace it by the scissors, one of the blades of which is to be inserted through the small opening which has just been made. Percy succeeded in this manner in the young Count D'Ambly. The operation was also followed with entire success in the child mentioned by Buchner. In those cases, on the contrary, where an aperture still remains, the operation is manifestly more easy, since it is always then practicable to follow with the eye as far as into the mouth, the instruments that we make use of. I will not recur again to the methods which present the best chances of success in such cases, and which I have described in the chapter on anaplasty. I will refer only in proof of the difficulty of curing coarctation, or imperforation of the lips by simple incisions, to the history of the miller of Horstius. The lips of this patient, in fact, after having been separated by the instrument, obstinately reunited a first, second, and even a third time. We also find in a case of M. Bondi, (*Bull. de Fér.*, t. II., p. 69,) that the incision made in order to destroy a coarctation of the lips, did not prevent the infirmity from being re-established to so great a degree in fact, that the opening of the mouth was reduced to the diameter of a pin's head, and that death succeeded at the termination of a few days, during a paroxysm of asthma. It is, however, to be remarked, that in the patients mentioned by Demarque, this operation appears to have fully succeeded, and to have been unattended even with any difficulty. (See Cheiloplasty.)

### § VII.—*Too Large an Opening of the Mouth.*

In the Germanic Ephemerides, (*Bull. de Féruſſ., t. II., p. 69.*) we find the history of a child in whom the mouth extended as far [nearly] as the ears. Having operated upon one side, an interval of some weeks was left before doing the same for the other, in consequence of the first operation having produced an alarming hemorrhage. I do not know to what extent it is possible for the mouth to reach up to the ears. I have, however, myself seen an old man in whom the mouth had been enlarged as far as the anterior border of the masseter muscles. This man had entered the hospital of La Charité for a double cancer, which obliged me to remove almost the entire length of the free border and the whole of the commissures of the lips as far as to the cheek-bone. The union of the parts had been effected by means of numerous points of twisted suture. But in consequence of an erysipelas, accompanied with intense delirium, which supervened on the third day, the patient, in separating his jaws with force, speedily destroyed and tore out the suture, together with the first agglutinations, which had already begun to take place. As the general affection continued nearly fifteen days, the lips of each wound cicatrized separately. In consequence of which there resulted a hideous deformity, which prevented the unfortunate old man from entirely closing his mouth, or from being enabled to retain his saliva effectually, or from performing mastication in a proper manner. It might have been practicable or even easy, by abrading the borders of these enormous prolongations of the mouth, to unite them by suture, and in this manner destroy the deformity; but the patient, satisfied with the cure of his cancer, and weary of his sojourn in the hospital, was desirous of returning home, and positively refused every proposition for another operation. As to the remark, that the mouth is either too large or too small when there are no traces of cicatrix or degenerescence upon the free border of the lips, this can scarcely be conceived to be possible, inasmuch as the natural dimensions of this opening have not and cannot have any thing absolute about them; unless we should admit with G. D. Tholosin, (*Gaz. Salut., 1766,*) "that the mouth (in every person) should be limited to the exact length of the first bone of the thumb." Operations, therefore, cannot be required except for extraordinary cases of narrowness or enlargement, which are produced by certain diseases.

### § VIII.—*False Ankylosis.—Stiffness in the movements of the lower jaw.*

Temporo-maxillary arthropathy, like all those diseases which may be developed around or in the neighborhood of the condyles of the jaw, are capable of producing there an induration or stiffness to so great an extent, that the separation of the dental arcades will be thereby more or less impeded. Certain chronic inflammations of the windpipe, internal phlegmasias at the bottom of the mouth, those especially which take place in the neighborhood of the last molar tooth, may also sometimes give rise to the same infirmity. The patient in such cases cannot open his mouth. Various methods of cure are then resorted to.

A. M. Ghidella, and some other practitioners, who assert that they have succeeded by making numerous incisions upon all the indurated ligamentous or cellular plates, could only have encountered those ankyloses, which are produced by retraction of the fibrous tissues. In my own opinion, it would not be prudent to recur to this process, unless the fibro-muscular bridles should be distinctly perceptible through the integuments. Ténon, (*Mém. sur l'Anat. et la Chir.*, t. II., p. 261—262,) who saw a case of this kind, resulting from a deep-seated disease of the jaw, and afterwards another, which admitted only of a separation of some lines in extent, had recourse to the employment of wedges of cork. The defect of conformation was congenital; after having divided one of the labial commissures, it was found that a cicatrix formed and reduced the opening of the jaws to two lines. Ténon insinuated between the teeth two wedges of cork, the thickness or number of which were gradually increased, until the mouth could be opened to the extent of nine lines in place of two.

B. *Dilating wedge.*—This idea, of placing a wedge between the dental arcades, has been improved upon by M. Toirac, (*Mem. sur la dernière Dent Molaire*, p. 13, 1828,) who has obtained really successful results from it in different patients whom I have seen, and who had been, during many months, unable to separate their teeth beyond a few lines. The remedy moreover is simple and of easy application. We begin by a thin and very elongated wedge, which is to be inserted between the two dental arcades, nearly as far as to the coronoid process; the size of this wedge is to be daily increased, until the movements of the mouth have regained their extent and liberty. It is obvious, however, that the presence of a cork or wooden wedge between the dental arcades can scarcely present any hope of success except in cases of immobility unaccompanied with unnatural adhesions of the gums with the inner surface of the cheeks or with actual ankylosis of the articulation.

C. *The wedge and incisions.*—M. Mott having met with many obstinate and complicated cases, has devised an instrument, which acts at once in the manner of a wedge, lever, and saw. This instrument which might, if necessary, be made to divide the coronoid process or the root of the neck of the condyle of the jaw, possesses the power, as a wedge and a lever, of gradually widening, and with a great degree of force, the two maxillary bones. The surgeon whom I have just cited, and who performed this operation successfully on seven different patients out of the eight that came under his treatment, was obliged in some cases to divide the commissure of the lips largely in the manner of Ténon, and to leave each border of the wound to cicatrize separately, not reuniting them until after having completely re-established the movement of the jaws. This is an operation, however, which, notwithstanding what has been said of it on the authority of M. Michels (*Gaz. Med.*, 1834, No. 26,) and of M. Mott, (*Journ. de Progrès*, t. XIII., p. 925,) and what the author has recently written to me concerning it, is still too imperfectly understood among us to enable me to asfix to it its just value. [See chapter on this subject by V. Mott, infra. T.]

### § IX.—*Unnatural adhesion of the Cheeks.*

It frequently happens in consequence of mercurial, carbunculous, or other inflammations, and as the result of any other kind of ulcer which may occur in the mouth, that the inner surface of the cheeks becomes agglutinated to the outer surface of the jaws or gums. From whence happens a deformity analogous to that I have just described, that is to say, an impediment to the separation of the jaws and the movements of the mouth. These adhesions sometimes make such effectual resistance to the movement of the jaw, that it is impossible for patients to open their mouth. Numerous examples of this are related in scientific works, and I have myself met with some of them. In appearance nothing is so easy as to remedy this disease; in reality nothing, however, is more difficult.

A. *Décollement*.—The first idea which suggests itself is to attack and destroy, either with the scissors or bistoury, the bridles and cellular attachments which constitute the abnormal adhesion, and without interfering with the continuity of the tissue proper of the cheek. But in reflecting on this point we soon perceive that this dissection, which as an operative process presents no difficulty, and in fact momentarily destroys the deformity, can only effect a radical cure in exceptional cases. What prevents the outer side of the gums and inner surface of the cheeks from agglutinating together in the natural state, is the existence of the mucous membrane which lines both of them. Now this mucous membrane, which has disappeared in the cases of adhesion, cannot be reproduced by the dissection which I have just mentioned. It must result, therefore, that the incisions which have been made will, in cicatrizing, reproduce the deformity. In even admitting that the entire traumatic surface may have cicatrized upon the cheek, independently of the gums, it could only do so at least by the production of an inodular callous and inextensible tissue, which in itself would be calculated to interfere excessively with the separation of the jaws. This difficulty is met with in all the other modes of operation which have been proposed as a remedy for the closure of the jaws. It is important therefore that we should not deceive ourselves on the subject of the apparent simplicity of this deformity, any more than we should upon the efficacy of the means which we may have it in our power to oppose to it.

B. However this may be, there are many processes to be made trial of in such cases. The most simple is that which I have attributed to *M. Toirac* in the preceding paragraph, and which consists in forcibly separating the jaws by means of wedges successively augmented in size, and introduced to a great depth into the most remote part of the dental arcades. This means, when there is no rigidity in the tissues or when the adhesions are recent and of but little extent, will suffice if continued for the space of fifteen days or a month, giving a respite of some hours to the patient from time to time, and resumed afterwards from week to week.

C. *The process of M. Mott*, that is to say, the introduction of a wedge performing the office of a saw and lever, in such manner as to allow of the division of the bone if necessary, would become requisite should the jaw be ankylosed or surrounded with inodular

tissue endowed with a great degree of resistance. The instrument of the surgeon of New York would also have its advantages as an auxiliary means, when it becomes indispensable to destroy the internal adhesions of the cheek or lip, with the cutting instrument. This last method comprises three principal processes.

D. *Simple dissection of the adhesions.*—The most rational method apparently, would consist in destroying by means of a straight or blunt-pointed bistoury, glided upon the finger or a canulated sound, or even without a director, from above downwards between the cheek and lower jaw, and then from below upwards between the cheek and upper jaw, all the abnormal adhesions to a sufficient extent, and in such manner as not to arrest the knife until after having reached as far as the pliant and perfectly sound tissues of this region. In this manner the operation is easy and prompt, and the immediate result of it as satisfactory as possible. The patient is to be seated upon a chair. The operator, separating one of the commissures with the forefinger and thumb of one hand or a good forceps, directs his bistoury with the other between the two dental arcades as far as to the neighborhood of the coronoid process. Turning then the edge of his instrument towards the outer surface of the teeth, he divides with free strokes and in a direction parallel to the plane of each jaw, all the bridles and unnatural tissues which attach them to the cheek. Should the teeth be so approximated as to prevent the instrument from gliding between them, he should make use of a canulated sound in order to conduct it outside of and along the alveolo-zygomatic (alvéolo-jugale) groove. It would even, if necessary, be practicable to plunge it into the tissues from before backwards, if there should be no groove to admit of a free passage to the director. Having reached this point we have now to struggle against the tendency of the wound to reagglutinate. To attain the object in these cases we have need of two kinds of resources; in the first place we must procure, by means of wedges or levers, a sufficient separation of the jaws, and it is for this purpose that the wedges and levers of MM. Toirac and Mott are indicated. If in fact we did not commence by giving a great degree of freedom to the movements of the lower jaw, new adhesions and an almost insurmountable contraction of the tissues would not fail to take place. On the other hand, we cannot prevent the inner side of cheek, now transformed into a traumatic surface, from becoming reunited to the outer side of the gums, except by keeping some foreign body between them. Ténon, in the three cases which I have quoted from him, and which relate rather to the adhesions under consideration than to a false ankylosis, appears to have succeeded by means of pieces of cork fastened by the aid of catgut against the outer side of the teeth. It is to be confessed, however, that we rarely succeed in this manner.

A young girl aged sixteen years, who, in consequence of a carbunculous (charbonneuse) affection of the mouth, had had from her birth a complete adhesion of the cheek and the right half of the lips to the dental arcades, and who was admitted into the Hospital of La Charité in the month of January, 1836, had already undergone two operations of this kind without any benefit. I in my turn destroyed all the abnormal adhesions, and I succeeded in procuring a separa-

tion of fifteen lines between the jaws in the space of a week. A piece of sheet lead, protected by cork, and kept permanently between the teeth and the cheek, appeared to me calculated to prevent any new adhesion. After the cure, however, there resulted only a slight amelioration, and a separation of only from three to four lines. It is necessary however to add, that the young girl evinced an extremely intractable disposition, and that in consequence of a confluent small-pox, with which she was attacked at the expiration of a month, I was compelled to remove every portion of the dressing or foreign bodies from the interior of the mouth before the perfect cicatrization of the wounds. A young man who had similar adhesions, which M. Serre had previously destroyed by a crucial incision in the cheek, and which I treated in the same manner in 1837, was not less unfortunate. After having carefully dissected and isolated the inner surface of the cheek throughout its whole extent, and after having sufficiently widened the jaws by means of levers and wedges, I inserted in his mouth a broad piece of sheet lead, upon which I intended that the wounds should cicatrize uniformly in every part of them. Every thing at first went on as well as I could wish, and at the expiration of five weeks, I considered my patient cured. The dispensing however with the use of the plate of lead during the space of two days, caused the separation of the jaws to be diminished one half, and nothing afterwards could prevent the inodular tissue from reproducing the deformity to as great a degree nearly as before.

E. Like M. Mott, I also was desirous in one case to ascertain if I could succeed better *by laying open the whole cheek* from the commissure as far as to the masseter muscle, and afterwards dissecting each of the borders of the incision, and leaving them to cicatrize separately in such manner as to reunite them at a later period, as we do in harelip. The cheek being thus separated, no longer interferes with the movements of the jaw, which can afterwards be relaxed and widened by the proper mechanical means. Having once obtained all that we desire in this respect, we reunite the borders of the artificial division. As the internal surface of each of the flaps has had time to cicatrize, we need have no farther apprehension that it will reagglutinate to the outer side of the gums. This method, which had failed in one of the patients of Ténon, and which succeeded no better with me, nevertheless procured some successful results with M. Mott. It would therefore be a process to be made trial of as well as that of simple decollements, which, united with cauterizations by nitrate of silver, obtained a remarkable cure in the hands of M. Gensoul, (*Journ. des Hôp. de Lyon*, t. I., p. 494.) I believe moreover, that by means of determination on the part of the surgeon, and docility on the part of the patient, we could very frequently obtain cures by both these processes; but I repeat that success here is infinitely less difficult to be accomplished than would at first view be imagined. We should be wrong moreover not to anticipate a swelling and sufficiently marked inflammation of the cheek and a large portion of the face, when, after such separations, we decide upon placing any foreign body between the cheek and the teeth with the view of preventing all reagglutination. Perhaps it would be better, should there be any inodular productions implicating the skin,

to remove them, and immediately repair the loss of substance by means of genoplasty, in taking a large flap in the neighborhood, as was done successfully by M. Mott. (*American Journal of Medical Sciences*, Nov. 1831.)

#### ARTICLE V.—SALIVARY FISTULAS.

There is no end to the remedies that have been devised for the cure of salivary fistulas, and most of them, we must admit, have been attended with some success.

##### § I.—*Fistulas of the Parotid Gland.*

A. *Cauterization*, either with a hot iron or by means of chemical substances, as employed by Galen, on a patient in whom the fistula, the result of a critical inflammation of the parotid glands (suite de parotides critiques), was situated under the ear; and as employed by Paré, the two Fabricii, Heuermann, Boyer, Langenbeck and a multitude of others, succeeds very well for fistulas of the parotid itself, that is to say, those which derive their origin from some branches and not from the principal trunk of the excretory ducts of the saliva. Galen had recourse to catheretic plasters (emplâtres cathérétiques), Paré to aqua fortis, Diemerbroeck and Jourdain to the actual cautery, M. Higginbottom (*Bull. de Fér.*, t. XXVI., p. 95), to sulphuric acid, and Boyer to nitrate of silver. The lapis infernalis deserves the preference, because it produces a drier eschar and one which is more adherent than any other. Nevertheless if the ulceration should be narrow and very deep, a cautery of the red oxide of lead might be substituted for the nitrate of silver, as was practised by me with success, in November, 1831, at La Pitié, in a man who had a parotid fistula produced by the opening of an abscess behind the border of the jaw.

B. *Blisters.* *Styptics* and astringents, which were equally eulogized by some practitioners, Becket among others, being less efficacious than caustics, have been long since abandoned. I have cured two patients, who had been affected several months with parotid fistulas, by means of repeated temporary blisterings upon the diseased parts.

C. *Compression*, made trial of successfully by Beaupré, Le Dran and Ruffin, who invented a machine for this purpose, advocated also by Imbert, Jourdain and Richter, almost always answers the purpose when the patient can support it, and when the state of the parts permit its employment. For that purpose we apply lint or graduated compresses upon the fistulous orifice, after which, by means of a fronde or chevestre bandage, or by means of turns of the ordinary bandage properly arranged, we produce pressure on this point in such manner as to keep the walls of the diseased duct in contact.

D. *Irritating injections*, as proposed by Louis, have for their object to inflame the fistulous passage and to bring about its agglutination. They may be made with sweetened barley-water, decoction of French roses in red wine, alcohol itself or any other exciting liquid, according as the tissues, whose adhesive inflammation we wish to produce, are more or less irritable. It is a remedy however which comes only in the third class, because it exposes to more acci-

dents and is not always successful, but one which, in some cases of obstinate fistula, is not to be despised.

E. If none of all these succeed, we may make trial of *excision*, comprising the ulcer in an elliptical wound, and afterwards reuniting by means of adhesive plasters or the twisted suture. If the disease still resist, we have no other recourse than *extirpation* of the gland ; but this remedy, ascribed to Pouteau, by M. Hedelhofer, has never, I believe, been carried into execution. It would be, in fact, a case in which the remedy is worse than the disease ; so much the more so as these fistulas sometimes finally disappear spontaneously, examples of which are given by Nuck, Ferrand, A. Dubois and M. Richerand.

### § II.—*Fistulas of Stenon's Duct.*

These different modes of treatment, though less efficacious when applied to fistulas of Stenon's duct, have nevertheless, in some cases, effected unquestionable cures.

A. *Cauterization*, for example, alone or associated with compression, obtained for Louis an unexpected cure, in a patient in whom the fistula had existed for the space of nineteen years, and who had already been operated on several times without any benefit. Munck, (*Praxeos Chirurg.*, lib. II.,) Lentilius, Lange, (*Bibl. Chir. du Nord*, p. 135,) and Mosque, (*Ancien Journ. de Méd.*, t. LXXI., p. 506,) have or had also succeeded in the same way. Ferrand, Nédel, Mursinna, Imbert, Jourdain and M. Langenbeck have been no less fortunate. But M. Gendron (*Annales de Cercle Méd. de Paris*, t. I., pp. 55, 92) has since maintained that in all the cases of this description the fistulas were in the gland and not in the salivary duct.

B. *Compression* without caustic and as an exclusive remedy, has also appeared to have been efficacious. Maisonneuve, who was the first to recommend it in such cases, established it between *the fistula and the gland*, with the rational object of closing up the passage to the saliva and enabling the wound to cicatrize. His patient, who had received a sabre cut upon the cheek, was radically cured at the expiration of 20 days. Louis, and with him most of the moderns, have considered that by acting in this way, we almost necessarily produce inflammation of the parotid, and that consequently this process cannot but be dangerous. Desault hoped to dissipate all these apprehensions by directing the compression *upon the gland itself*, which he proposed to atrophy. Whether the atrophy had really taken place as Desault asserts, (Gavard, *Splanchnol.*, p. 208,) or that the parotid continued to perform its functions afterwards, as Boyer seems to think, certain it is that the fistula speedily cicatrized and that the patient suffered no return of it. However this may be, there is in the treatment of these authors, two distinctions which it is important not to confound ; that of Maisonneuve, who proposes only to interrupt the course of the saliva temporarily, and that of Desault, (Vedrine, *Journ. de Desault*, t. IV., p. 294,) who prefers to dry it up at its source. Without agreeing with Heuermann, that the parotid, under such circumstances, will always suppurate and ulcerate, and pass into the state of scirrhus or cancer, I can nevertheless not admit the innocuousness of a remedy like this, which should in my opinion be reserved

for patients who have a dread of every other kind of operation, or have not been cured by them. Trécourt (*Mém. de Chir.*, p. 75, 1769,) had recourse to it by applying it upon the ulcer-like Courtavoz because the seton was not admissible.

C. *Ligature upon the duct.*—Zang, who shares in part the opinion of Maisonneuve and Desault, resorts to the process of Viborg, to atrophy the parotid. In place of compression, which is always uncertain, this surgeon, inasmuch as the object is to prevent the saliva from passing, proposes to apply a ligature on the duct of Stenon outside of the fistula. Quite a number of experiments upon animals towards the close of the last century, demonstrated to him that this ligature is unattended with danger. In order to apply it, it would be necessary to make a vertical incision upon the anterior border of the masseter, immediately below the zygomatic arch. The canal being once laid bare, is to be isolated from the other tissues, especially from the branch of the facial nerve which accompanies it on its upper side. Nothing afterwards is easier than to surround it with a ligature, and obliterate it. There is no doubt in principle that if the sacrifice of the functions of the parotid gland has been decided upon, the advice of Viborg should be followed to the exclusion of that of Desault and Flajani, if it could be proved that the saliva would allow the ligature to effectually obliterate the duct in this manner; but compression, presenting moreover the advantage of requiring no incision, will notwithstanding be adopted in preference, by timid and pusillanimous patients: whence it follows that these two methods might each become susceptible in practice of particular application.

D. *The twisted suture*, as in harelip, when the anterior portion of the canal remains unaffected, answers, according to Flajani, Percy and Zang, in many persons, and in most cases renders any other means unnecessary should it be applied in good season. M. D. Lasserve (*Cas. de Chir.*, p. 27, Perigueux, 1830) having wounded the canal of Stenon while extirpating an osteo-fibrous tumor of the cheek, made at the bottom of the wound an opening of two lines which penetrated into the mouth, and the lips of which he successfully united by suture. M. Pl. Portal (*Clin. Chir.*) having extirpated a salivary tumor, was no less successful in another case. The same occurred to M. Bégin, (*Pathol. Chir.*, t. I., p. 209, 2d edit.)

E. *Seton through the natural duct.*—Morand first, and Louis afterwards, are the two authors to whom we are indebted for the idea of dilating Stenon's duct for the cure of its fistulas. The surgeon being placed in front of the patient, seizes the labial angle by means of the thumb introduced into the mouth, and the two first fingers of the left hand applied upon the cheek if the fistula is on the right side, and with the two fingers of the right hand, if it is situated on the left; stretches it and reverses to the outside; introduces with the other hand the head of a fine probe, furnished with a thread, into the natural orifice of the parotid duct; withdraws it through the wound, where he leaves the little seton whose two extremities he unites by a knot, and by which he is enabled on the day after to draw into the mouth from the exterior to the interior a small cord of silk; and each day renews this meche by withdrawing it through the wound and by adding to it each time one strand more. Should it be attended with too much

difficulty to penetrate through the mouth, Louis proposes that we should immediately introduce the probe through the wound. It must be almost a matter of indifference, in fact, whether we enter by one mode or through the other.

In this last case, however, the thumb should be substituted in place of the fingers, in order to straighten the canal and to incline its orifice forwards when the probe is about coming out; not because it makes an angle while it traverses the buccinator muscle, as is generally thought with Louis, but because it falls at an acute angle on the mucous membrane, which shuts it up in great part and appears to throw its aperture backwards to the extent of a line. As soon as the saliva passes freely into the mouth, and the ulcer has become contracted up to the periphery of the meche, the seton is to be removed, or what is preferable it is to be divided upon a line with the integuments, in order to draw it towards us by its buccal extremity to the distance of about a line, and not to take it away entirely until after having completely closed the fistula by means of repeated cauterizations and drying applications.

F. *Seton through a new duct.*—If it were always easy to find the anterior end of the divided canal; if it were not that this canal in most cases has been for a long time obliterated when the physician is called for; if, in fine, its preservation was a matter of much importance, the process of Louis accurately imitated from the method of Méjean in the treatment of fistula lachrymalis, would certainly have obtained unanimous concurrence; but this is not the case, and the following is the method which almost all operators at the present day have recourse to.

I. *Deroy*, who, according to Saviard, appears to have invented this method, pierced the cheek through and through with a hot iron, thus obtained a loss of substance and cured his patient. *Cheselden* a short time after gave the same advice.

II. *Duphenix* adopted a mode somewhat different. He made use of a long and narrow bistoury; plunged it in from above downwards and from before backwards; made it turn several times upon its axis in order to round off the opening which he had just made; introduced in its place a canula shaped like the point of a pen which was designed to conduct the saliva into the mouth, and the outer extremity of which, concealed in the cheek, was made to correspond with the parotid opening of the fistula. The borders of the ulcer were then excised, and in order to shut it up Duphenix immediately had recourse to the twisted suture. The canula left to itself came away on the sixteenth day, and the cure was thus accomplished.

III. According to *Monro* the cautery of Deroy and the bistoury of Duphenix are advantageously replaced by a shoemaker's awl. By means of this instrument, which the celebrated surgeon of Edinburgh appeared to have a great regard for, he traversed the cheek in the natural direction of the canal and contented himself, for a seton, with a thread passed into the wound. When its track was thereby rendered callous he removed this thread, ascertained that the saliva ran into the mouth, and then paid attention to the small external ulcer.

IV. *Platner*, who was a warm advocate of this mode of operating, recommends that the patient should be made to use a gargle of

brandy, in order to accelerate the induration of the internal orifice of the new duct, and that we should at the same time compress the wound on the exterior or touch it with the nitrate of silver.

V. J. L. Petit, after having traversed the parts, recommends that we should enlarge the buccal opening of the perforation by daily introducing into it a small piece of sponge until the fistula is closed up.

VI. *Tessart* as soon as he had passed a simple thread through the cheek perceived that the saliva flowed into the mouth. The use of a few strips of adhesive plaster proved sufficient to close up the ulcer promptly.

VII. *Flajani* recommends that we should pass a double silk thread through the fistula by means of a needle, and that in other respects we should proceed after the manner of Monro.

VIII. *Desault*, in a patient who could not support compression, made use of a hydrocele trochar to pass the thread through the cheek, fastened a meche to the internal extremity of this thread, and drew it from the mouth to the bottom of the fistula, in such manner, however, as not to interfere with the cicatrization. Withdrawn and replaced each day of a little larger size, the meche was abandoned some few days before the thread which supported it, and when the wound had become almost entirely closed.

IX. *Bilguer* like Desault had recourse to the trochar; but in place of the seton he left a leaden canula permanently in the inner half of the wound, which he closed up outside.

X. *Richter* placed in the mouth a piece of cork in order to support and receive the point of the trochar; made use of a seton of thread, the size of which was gradually increased; withdrew it when the new canal was sufficiently solid; afterwards cauterized the exterior wound or scarified it, and then reunited its borders. In the most obstinate cases he introduced through the mouth into the artificial duct, and left there permanently, a gold or silver canula provided with a head, in order to prevent its falling out.

XI. *M. Atti* more recently, in 1824, intending to improve upon the process called Béclard's, has on the other hand, rather modified that of Desault. By means of the canula of a small trochar, he is enabled to conduct through the cheek a tent of lead, pierced on its sides with several holes, supported externally by a thread which keeps it in the wound, and divided to the extent of about a line at its internal extremity into three branches, which being bent in the mouth, hinder it from being drawn upon by the thread. When the fistula is sufficiently reduced, *M. Atti* touches it with the lapis infernal, after having removed the thread, or even endeavors to close it up entirely. The leaden tent abandoned in the cheek leaves behind it, in escaping into the mouth, at the expiration of a certain time, a new canal, which perfectly replaces the old one. The successful results which the author brings to the support of his method confirm in fact its value, and his process is without contradiction one of the most certain that can be imagined.

XII.—It is for example assuredly preferable to that of *M. Ch. Bell*, who like Flajani passes a needle through the cheek in order to introduce a thread and afterwards a seton into the fistula; and who,

when the internal opening of the wound has become callous, fastens a hair or very fine thread to the external extremity of the first thread, and afterwards proceeds in the manner of Desault and Bilguer.

G. *Internal tent.*—Since the last thirty years, surgeons with the hope of rendering the operation more prompt, and of being enabled to unite the wound by first intention, have turned their attention into another direction.

I. *M. Langenbeck*, rejecting every kind of foreign body, has proposed to dissect and to isolate the posterior extremity of Stenon's duct, then to make at the bottom of the fistula an opening which would allow of its being conducted into the mouth, and in order to fix it in its new relations to unite immediately the borders of the wound. But I am not aware that this professor has up to the present time had any imitators, nor should he have any in future.

II. *M. Latta* says that the best mode of curing salivary fistulas, consists in passing a catgut through the cheek, after which we should endeavor to introduce its external extremity in the parotid duct, leaving the other in the mouth, and closing up the wound accurately, either by the suture or adhesive plasters; as if it were a thing that was always possible to find the orifice of Stenon's duct at the bottom of an ulcer! *Zang*, however, eulogizes this mode of operating, when the fistula is very large, and the anterior portion of the canal shut up. Only he recommends that we should make use of the canula of the trochar for the purpose of conducting the catgut, that this latter should be shaped into a point at the extremity, which is to penetrate in the direction of the parotid, and in order that the saliva may run along its sides, that it should be made so as not to fill up exactly the artificial canal.

III. In reducing the practice of Latta and Zang to its true value it is immediately perceived that it differs from that of Desault or Ch. Bell, or that of *Vedrine*, (*Journ. de Desault*, t. IV., p. 294,) which latter traversed the bottom of the wound with a carlet needle, (*aiguille en carlet*,) only in the fact that they dispensed with retaining their tent outside by the aid of a foreign body; which enabled them to close up the fistula immediately, and to do this, whether they succeeded or not in placing one end of the catgut in the natural duct of the gland. It is, however, possible that we may cure by this mode, as by most of the processes which have been pointed out above; but it has the disadvantage of not holding the seton sufficiently secure in the thickness of the cheek, and of enabling it to escape too soon.

IV. The same objection may also be made to *Percy*, who on his part states that he had often succeeded by making use of a leaden sound, instead of the catgut which the Germans employ. Without claiming any pretension to it, *M. de Guise*, (*Bull. de la Fac. de Med.*, 7 année, p. 40—44,) proceeded in the following manner in a young patient in whom the fistula, which had already existed a long time, had resisted a greatest variety of means resorted to. A hydrocele trochar inserted through the wound from without inwards, and from before backwards, enabled him to introduce into the mouth a leaden wire through the canula of this instrument. By means of a second puncture in the direction of the natural canal, that is to say, from

behind forwards and always from without inwards, he was also enabled to bring the other extremity of the metallic wire into the buccal cavity, reverse its two portions upon the inner surface of the cheek, and then unite the exterior wound by means of the twisted suture. At the expiration of a few days the agglutination appeared complete. The leaden noose, whose convexity corresponded to the fistula, and which included in its concavity the internal tissues of the cheek, was cautiously withdrawn, and from that time the cure was no longer doubtful.

V. Three observations related under the name of Béclard, prove that this surgeon frequently imitated M. de Guise with success. In place of leaving the two extremities of the leaden wire free in the mouth, he united them and twisted them upon themselves, with the view of gradually cutting through the intervening tissues, as in fistula in ano. Moreover, in order to make the second puncture, he introduced the trochar through the mouth, in order that the beak of the canula might not prevent its being withdrawn through the same track after having adjusted the other extremity of the tent; which is not practicable when it is passed from the exterior to the interior, as it is the first time.

VI. *M. Grosserio*, finding that it was not as easy to pass the trochar through the mouth as it was through the wound, and desirous of remedying the inconvenience pointed out by Béclard, has recommended a trochar provided with a canula which is wholly devoid of any shoulder. By means of this modification we withdraw it with full as much facility through the mouth in the second stage of the operation as through the wound in the first stage.

VII. Finally, *M. Mirault*, who has since recommended the same course, considers that a meche of thread would be preferable to a leaden wire, and that by means of a knot-tightener, made like that of Desault, we would more speedily accomplish our object than by simple torsion.

VIII. *M. Roux*, (*Journ. Heb.*, t. II., p. 178,) governed by the same idea as *M. Mirault*, made use of a silk seton with entire success. Finally, *M. Vernhes*, (*Revue Méd.*, 1830, t. IV.,) has been no less successful with a gold wire, placed from above downwards, not transversely, as recommended by *M. de Guise*, and which he employed like Béclard to cut through the intervening tissue by twisting it gradually upon itself.

IX. Perhaps also we might confine ourselves to perforating in any manner whatever the parotid duct posteriorly at a short distance from the fistulous orifice, and to establishing on the track which the saliva takes an internal fistula in order to be enabled to close that which is outside. But this process which I proposed in 1823, has not yet been put to the test, and the facts of Trecourt, (*Mem. de Chir.*, p. 71,) or of Charve, (Lombard, *Opusc. de Chir.*, p. 24,) which have reference to it, are not very conclusive. Like that of *M. de Guise* and all its modifications, moreover, it would be applicable only in cases where the wound of the duct has not approximated too near to the masseter muscle. Also, in order to determine the relative value of so many different methods, it would be necessary to exhibit all the modifications which salivary fistulas may present. In this

point of view there are none of them which may not have their advantages.

H. *Appreciation.*—Nevertheless, the portion of quill of Ravaton, (*Chir. d'Armée*, p. 571,) the seton, after the manner of Desault, or Ch. Bell, the leaden tent of M. Atti, or that of Percy, Latta, or Zang, are, all things being considered, the best, and ought to be preferred. To proceed in the manner of M. de Guise or Béclard, in adopting the modification proposed by M. Grosserio, it would be requisite that the fistula should be sufficiently remote from the masseter muscle. Under such circumstances this method is the most certain, and unquestionably the best of all.

### § III.—*Sub-maxillary Gland.*

If it should happen as in instances which are on record, that a wound or ulcer in the sub-hyoid region has extended as far as the sub-maxillary gland, and remained fistulous as in the case of Muys, (*Obs. de Chir.* dec. 6, obs. 4, p. 341,) or that of Lecat, (*Suppl. à la Chir. d'Heister*, t. V., p. 214, in 8vo.) we should be obliged, in order to effect its cure, to make trial of all the methods which have been passed in review in treating of fistulas of the parotid gland. M. Larrey, (*Acad. Roy. de Méd.*, 27th March, 1827,) abraded its borders, applied the quilled suture and succeeded. If it was found impossible to dry up the source of an ulcer of this kind; if, moreover, the secreting organ itself was profoundly altered and threatened with a serious degeneration, extirpation, which Pouteau ventured to recommend for the parotid, would here be a last resource, which should not be neglected. Should, says Rossi, (*Méd. Operat.*, t. I., p. 258,) cauterization and compression not succeed in fistulas of the duct of Wharton, the sub-maxillary gland must be extirpated. M. Amussat, (*Acad. Roy. de Méd.*, 27th March, 1827,) who considers that he has performed this operation, states that he has every reason to be satisfied with it. We shall hereafter speak of the course that is to be adopted under such circumstances.

### ARTICLE VI.—RANULA, (Grenouillette.)

Ranula is a disease of little importance, and one which, as Boyer says, is not dangerous. It has, however, been seen on more than one occasion to compromise the life of the patient, and in all cases it is sufficiently annoying to induce us to devise some mode of relief. F. de Hilden speaks of one which filled the entire mouth; and Marchettis of another which was so large as to compress the carotid arteries and the trachea. Alix states that he operated upon one in a child, which was upon the point of producing suffocation, and Taillardant mentions another which was of so large a size that it prevented the patient from eating. A. Burns speaks of an adult man whom he saw in the practice of Cline, and whose respiration was so much interfered with by the presence of a ranula that he swooned away after having been attacked with violent convulsions. A man who came, in 1837, to the public consultation at the hospital of La Charité, had a ranula which, occupying the totality of the left parotid

and supra-hyoid regions, must have contained near a pound of fluid. I have seen two other cases in which the mouth was as it were filled up by them. Though the ancients were but imperfectly acquainted with the nature of this disease; though some make of it with Celsus an encysted tumor, and that others with Aetius ascribed it to a varicose dilatation of the sublingual veins, or with Abu'l Kasem to cancer, or with Paracelsus considered it to be an apostema of the vessels of the tongue, or with Aranzi an ordinary abscess; they nevertheless attempted its cure by almost all the different means employed since the time that Louis endeavored to prove that it is nothing else but a tumor produced by an accumulation of saliva, either in the maxillary gland itself, transformed into a cyst, or in its excretory duct, which has been enormously dilated. MM. P. Dubois and Stoltz (*Gaz. Méd.*, 1833, Novembre; *Journ. des Conn. Méd. Chir.*, t. I., p. 182,) have each given an example to prove that ranula is sometimes congenital, and that it may occupy the sublingual gland. In place of pure and limpid or inspissated saliva, mucus or purulent matter, or a viscous substance of more or less consistency, the diseased pouch is sometimes filled with gravel, sand, or even legitimate calculi. In a case related by Tulpis it was composed of a concretion so hard, that it became necessary to use the actual cautery in order to destroy it. Schultz, E. Koenig and V. Rieddin, mention facts of the same kind, which have also been met with by J. L. Petit, Freeman, Sabatier, Taillardaut, Loder and Boyer. M. Walther (*Revue Méd.*, 1826, t. II., p. 142,) asserts that he has, in two instances, found calculi in Wharton's duct. An analogous fact has been since published by M. Baker, (*New Amer. Archiv.*, &c., p. 249, July, 1835.) The diagnosis was clear in all these cases. An incision of sufficient extent upon the tumor allowed of the extraction of the foreign bodies, and the cure was speedily accomplished. Ranula, (grenouillette,) properly so called, requires other precautions. Experience has shown that, whether, after the example of La Faye, (*Journ. de Connais. Méd. Chir.*, t. I., p. 182,) we admit two species of it, one for the sublingual gland, and the other for Wharton's duct, or whether on this point we concur with the general doctrine, the evacuation of the liquid will not be found a sufficient preventive of a second obstruction. For the treatment of this disease, incision, caustics, tents, dilatation, excision, extirpation, permanent canulas, the seton, &c., have each in turn had their partisans.

### § I.

*Incision*, which first presents itself, immediately empties the tumor and appears to cure the disease. The organism, moreover, must have first suggested this idea, inasmuch as ranula very frequently bursts of itself. Hippocrates had already recommended it, and effected it by means of a lancet. Celsus and Aetius speak of it, but do not appear to have any great confidence in it, any more than Rhazes, who had his fears on this subject, from the vessels which the bistoury may at the same time wound. Abu'l Kasem, though somewhat bolder, did not venture to have recourse to it except for sublingual tumors that were of a whitish color and fluctuating, seeing

that by cutting into the others we incurred the risk of making them pass into a cancerous condition ; that is to say, that Abu'l Kasem had been led, without knowing it, to distinguish the legitimate grenouillette from the tumors with which it was in his time confounded. *Paracelsus*, in place of plunging the instrument into the cyst itself, confined himself to opening the vessels which go to it, and can scarcely therefore be considered among the number of partisans for the incision of ranula. When a fluctuation is perceived in it, *Aranzi*, who does not distinguish it from abscesses, recommends that it should be opened with the phlebotome, and *P. Forrest* says that it does not return if, after having incised it, the surgeon takes care to make pressure upon it, and to expel all its contents. According to *Bartholin*, *Six* waited until the inflammation in the tumor had ceased, when he pierced it through and through, in order to evacuate the contained matter. *Jourdain*, notwithstanding the arguments of *V. D. Wiell*, and the experience of every day, still maintained, about the middle of the last century, that a free incision by means of the lancet very frequently effected a cure of the grenouillette, and that we may confine ourselves to this remedy. There are, in fact, patients who have been in this manner permanently cured of their disease ; but all the world, at the present day, agree that this remedy is only palliative, and that in general the salivary cyst is not long in again becoming filled up.

### § II.—*Catheretics*, (cathérétiques.)—*Injections*.—*Tents*.

*Paracelsus*, in order to retain for the operation a part of its ancient simplicity, to prevent the wound from closing up too rapidly, and to effect in fact a cure which incision alone was far from always obtaining, maintained in the wound detergent substances ; *Purmann* introduced styptics into it and was successfully imitated by *V. D. Wiell* ; *Camper* touched it with the lapis infernalis, and *Acrel* left in it a *roll* of lint saturated with the spirit of salt ; while *Callisen* recommends that we should place in it *lint only* or cauterize its bottom with a mineral acid ; which causes, he says, the cyst to become detached and enables us to remove it. A surgeon of Saltzbourg, quoted by *Sprengel*, found it more convenient to inject into it camphorated *spirits* or essence of turpentine and cured his patient. It was the same with a patient mentioned by *M. Haime*, of Tours, (*Precis Méd. d'Indre et Loire*, 1821, 2nd trim.,) and whom this physician cured by means of injections, thereby inducing the adhesion of the walls of the cyst. *Leclerc* had not been less fortunate with the *nitrate acid of mercury*, and the case of *Sabatier* proves that a tent of lint renewed or cleaned each day, suffices after the incision of the ranula to render the wound fistulous and to effect a radical cure. Nevertheless, as it not unfrequently happens that the disease resists all this combination of remedies, it has been proposed to destroy a portion of the sac of which it is constituted. I am in truth surprised that no one up to the present time has applied to salivary tumors the puncture and irritating injections used in hydrocele. Everything, for example, induces us to believe that iodine injections would prove successful.

### § III.—Cauterization.

Caustics were employed at the time of Aetius. Dionis gave the preference to a mixture of sulphuric acid and honey, but the hot iron has found a greater number of partisans than escharotics, properly so called. These last, in fact, are less easily managed, less sure in their action, and almost always dangerous when applied upon so delicate a region as the mouth. Paré, who had fully experienced the inconveniences of this remedy, proposed to plunge into the tumor a species of trochar heated to a white heat, passing it through a metallic plate destined to protect the surrounding parts. In this manner he obtained a loss of substance, the wound remained fistulous, and the grenouillette did not return. F. ab Aquapendente passed his cautery through a perforated canula. Louis gives nearly the same advice, that is to say, he prefers the actual cautery to the cutting instrument; only he makes the remark that by placing the opening of the cyst in front, we incur the risk of seeing the saliva issue out and escape involuntarily from the mouth. Nevertheless cauterization is rarely employed at the present time, as much perhaps because of the fear that it occasions to the patient as owing to its not being always infallible. M. Larrey, (*Clin. Chir.*, t. II., p. 48,) who recommends that the incandescent cautery should perforate the tumor through and through, is almost the only person, with the exception of M. Pl. Portal, (*Gaz. Méd.*, 1834, p. 540,) who continues to give it the preference.

### § IV.—Excision.

Tulpius, J. L. Petit, Desault and Richter, desirous of systematizing the process of La Cirlata, who hooked up the ranula with an erigene and excised it with a razor, or that of F. ab Aquapendente, who seized it with the forceps and divided it with the scissors or applied the ligature to it, have endeavored to prove that by removing a flap of sufficiently large size from the cyst, the tumor is scarcely ever reproduced. The fact is, that in his practice at the Hotel Dieu, Desault almost always succeeded by this method, one which M. Coley (*The Lancet*, 1828, vol. II., p. 495), states that he had had every reason to be satisfied with, and which Boyer, who never practised otherwise, had the highest opinion of. It is the method adopted by M. Graefe, (*Revue Medical.*, 1830, p. 143,) who in this manner removes half of the cyst. It is moreover performed in various ways. The most simple and surest mode is the following: the jaws of the patient being separated as much as possible, the surgeon provided with a straight bistoury commences by making a semilunar incision with its convexity outwards, upon almost the entire surface of the tumor facing the gums; he then seizes with a good pair of dissecting forceps the flap thus cut, and detaches it by means of the scissors while giving it an elliptical form. In general no vessel of any importance is wounded. It is rare that there are more than a few drops of blood or that the patient experiences any pain. Dressings are useless, and the wound which diminishes from day to day without however entirely closing, prevents any return of the disease, at least in most cases.

### § V.—*Dilatation.*

Though the disease in general is owing to the course of the saliva being interrupted, and though Louis, (*Mém. de l'Acad. de Chir.*, t. IX.) imitated by Leclerc, may have succeeded in clearing out the orifices of Wharton's ducts, which seemed like two aphthæ on the sides of the frenum, and that he has been enabled to dilate them by placing a sound in them, and that the patients thus treated have recovered; it must nevertheless be conceded with Richter, that dilatation in such cases would be a most uncertain resource, one that was exceedingly difficult, and often even wholly impracticable. Excision after the manner of Boyer has undoubtedly immense advantages over it, without exposing to the same manipulations and difficulties.

### § VI.—*Permanent Canula.*

This has not prevented some modern operators from pronouncing in favor of incision, which they have thought could be made more efficacious by combining it with the employment of a canula left permanently in the opening of the cyst. The idea of a combination of this kind had not been mooted before the time of Sabatier, though this author himself speaks only of a canula left in the wound a sufficiently long time to render it callous. But in his time it had evidently suggested itself to the minds of some other practitioners, inasmuch as he speaks of a patient who had worn one for three years, and whom he recommended to keep it in still longer. This instrument, which was about an inch long, and having on one of its extremities a lenticular button, which prevented it from penetrating too far forward, did not produce any serious inconvenience, either to the speech or mastication of the person who wore it. Lecat (Richard de Hautsierck, t. I., p. 403, pl. 408) cured a patient of grenouillette by means of a short canula contracted in its middle, and terminating in a shoulder on one extremity, and like the spout of a watering pot at the other. This is the canula that Dupuytren (*Bull. de la Fac. de Méd.*, t. VII., p. 65) has modified in an ingenious manner, by making it still shorter, and terminating it by a lenticular plate at its two extremities. This professor, after having opened and emptied the cyst, inserted into it one of the extremities of his instrument, while the other remained in the mouth. The tissues which embrace its neck, soon become sufficiently contracted to prevent its becoming afterwards displaced either in one direction or the other. The saliva escapes through its canal, and the patients keep it in as long as is judged proper, sometimes even during their whole lives, without being in reality incommoded by it. Dupuytren recommends that the buttons of his canula should be of gold, silver, or platina, and that they should be convex on their free surface only, and concave within, in order that the food may not become caught between them and the walls of the cyst. There is no objection in fact to making trial of this method, which, according to the editors of Sabatier, succeeded constantly at the Hôtel Dieu. But I do not perceive in fact that it possesses any particular advantage over simple excision, which, on

the other hand, was rarely attended with failure in the hands of Boyer.

### § VII.—Seton.

It is seen from this review that the treatment of grenouillette is entirely based upon that of hydrocele, as M. Haime has likewise remarked, and also Purmann, who had already endeavored to effect adhesive inflammation of the salivary cyst in the same manner as we do adhesive inflammation of the tunica vaginalis. There remains the seton, which might be employed with some prospect of success, if the other method were not infinitely more rational. This resource, however, possesses a certain degree of efficacy, as is proved by the practise of Physick, (Dorsey's *Elements of Surgery*,) who was long in the habit of employing it, also by the observations of M. Lloyd, (*Lancet*, 1828, vol. II., p. 495,) who also made use of it at London, and the memoir published by M. Laugier, (*Journ. Hebdom.*, t. III., p. 9.) The presence, moreover, of a *foreign body* of the smallest size in the salivary ducts, is sufficient to produce accidents of quite a serious character. We have seen above, that saline concretions and various kinds of calculi sometimes form in these organs. A disease of the mouth, which resisted every treatment, disappeared after the extraction of a fish bone, which had got introduced into Stenon's duct, (*Revue Méd.*, 1831, t. II., p. 373.) A similar thing took place in a shoemaker mentioned by M. Robert, (*Ibid.*, t. II., p. 374,) who had a hog's bristle in Wharton's duct. A piece of straw, which had entered into this canal, caused various accidents there, and abscesses which were not cured until after the expulsion of the foreign body, (*Gaz. Méd.*, 1838, p. 793.)

### § VIII.—Extirpation.

Loder and Sabatier have seen the disease resist these different modes of treatment, and many authors had already contended that the surest mode is to extirpate the grenouillette or to destroy it entire by means of caustics. Celsus, in a rather obscure passage in his works, would lead us to believe that he himself was acquainted with this extreme remedy. Treating of sublingual tumors, he recommends when they do not yield to puncture, that we should incise the skin that covers them, in order to extract them, taking care not to wound the vessels, while an assistant separates the lips of the wound. Mercurialis, the first author who distinctly recommended it, raises up the tumor with an erigene, cuts it at its base in the mouth, and says if we do not destroy the whole cyst, the disease is sure to return. Diemerbroeck commenced by making a crucial incision into it, and then extirpated the whole of it. Alix, without going as far as this, incised it largely, but lengthwise, and then removed as much of the cyst as he could by means of the scissors. Marchettis, who in a very severe case had introduced a meche as far as into the mouth, by penetrating through the supra-hyoid region, was, nevertheless, obliged to extirpate as much of the tumor as he could, and to destroy the rest with a hot iron. It appears, nevertheless, that complete extirpation was but rarely performed by these different

practitioners. It scarcely ever becomes indispensable unless the evil should threaten to take on a serious degenerescence, or to be transformed into a solid tumor. Otherwise, all that is actually necessary is, to excise the portion which projects into the mouth; so much the more so, because by then touching the bottom of the wound somewhat actively with the nitrate of silver, its exfoliation is readily accomplished. An enormous cyst occupied the entire supra-hyoïd region; M. Malcolmson (*Gaz. Méd.*, 1838, p. 743,) excised an ellipse from it, and the gland was seen at the bottom; he then excised this, and extirpated it nearly entire, when the patient recovered; but I am not satisfied that the lymphatic ganglions may not have here constituted the great bulk of the disease removed.

#### ARTICLE VII.—TUMORS OF THE MOUTH.

Tumors that are salivary, at least in appearance, are sometimes encountered elsewhere than on the sides of the tongue. I treated at the Hospital St. Antoine, a patient who had had one of these for a long time, between the lip and the left superior alveolar arcade, and who procured relief every month by plunging into it a bistoury or a lancet. M. Graefe states that he has often met with them in the substance of the lips. Wilmer mentions one, which was situated in the lower jaw; and Dupuytren, as well as Runge, (*Thèse de Haller*, t. I., French translation,) have frequently seen them in the substance even of the bones. The one which M. Latour, (*Arch. Gén. de Méd.*, t. VIII., p. 52,) had under treatment, occupied a large portion of the cheek, and M. Ricord, (*Ibid.*, t. VIII., p. 527,) has published under the title of hydatid of the canine fossa, a case which probably belongs to the same kind of lesion. All the processes above pointed out are applicable to these tumors; but when we are desirous of obtaining a radical cure, it is advisable to have recourse to simple excision, conjoined with cauterization, or to extirpation. These tumors, filled with a viscous yellowish or transparent liquid, are not rare. I have seen them in the tissues of the cheeks and lips, between the gums and cheek, as well as between the gums and tongue, and without any communication whatever with the salivary ducts or glands. M. A. Bérard, (*Arch. Gén. de Méd.*, ser. III., t. I., p. 402,) extirpated one which was of the size of an egg. A concrete tumor was situated between the tongue and the jaw; to remove it entire with greater facility, M. Roux, (*Mercier et Vigla, Journ. des Conn. Méd. Chir.*, t. IV., p. 104,) divided the lip vertically and found it necessary to saw through the inferior maxillary bone on the median line. It became necessary to await the exfoliation of some splinters, but the operation was followed with entire success. The wounding of the salivary ducts may also give rise to tumors of this description, even upon the track of Stenon's duct. M. Verhnes has published an interesting case of this kind, which must be classed with that of M. D. Lasserve; in consequence of a traumatic lesion, there formed upon the inside of the cheek a small oblong tumor filled with saliva, and which M. Verhnes succeeded in curing by passing through it a small trochar, attached to which was a double gold wire, which he employed in the manner of a seton. If a case of this kind should again present itself

the method of this surgeon ought to be adopted, unless we should prefer to confine ourselves merely to the process of Béclard for salivary fistulas, or to the treatment of grenouillette.

### ARTICLE VIII.—THE TONGUE.

#### § I.—*Operation for Filet, (Tongue-tie.)*

The species of fibro-mucous fold which attaches the free portion of the tongue to the posterior surface of the chin, and which is called *frenum* when its dimensions are properly proportioned, takes the name of *Filet*, when it is too long from before backwards, or too short from above downwards. It then becomes impossible for the infant to suck. The point of the tongue being then arrested against the lower wall of the mouth, renders it impossible to draw it outwardly, in order to seize the nipple. This is an arrangement, therefore, which might be attended with serious consequences, if we did not immediately attend to its removal. Only that we should be careful not to suppose that the infant is tongue-tied as soon as it does not suck, or is a long while in beginning to talk. Such accidents, which a thousand different causes may occasion, do not depend upon the frenum of the tongue, unless it be found that when the finger is passed into the mouth, it is impossible to be seized hold of by it, or that its point cannot reach as far as on the lips, in which cases only we should undertake the section of the filet.

A. There is nothing to show, unless it be a remark in Cicero, that this small operation had been described *before the time of Celsus*, who, in order to perform it, recommends that we should raise the tongue with the forceps, and already at that period advises that we should be careful not to divide its vessels. Paul of Egina and Abu'l Kasem employed a hook in place of the forceps. Avicenna, in order to be more certain to avoid any hemorrhage, passed a ligature through the base of the frenum, and in this manner dispensed with the cutting instrument. De la Cerlata, who censures midwives for tearing out the filet or dividing it with their nail, destroyed it by means of a particular instrument, and raised up the tongue with his two fingers.

The sharp-pointed scissors of Friederich are justly condemned by Fabricius ab Aquapendente, who severely censures the pernicious practice of midwives, already pointed out by De la Cerlata, and moreover remarks that this operation is rarely required. F. de Hilden is of the same opinion, and performed the operation with a cleft instrument, which served at the same time as a scissors and as a fourchette to raise up the tongue. The instrument of M. Montain (*Mém. de Therap.*, 1836, p. 34,) is nothing more than an improvement of that of F. de Hilden. The blunt fourchette and the large scissors devised by Scultetus and Solingen are useless. The idea of cutting the filet with a bistoury heated to a white heat, as was practised by Lanfranc, would at the present day be considered absurd. The spring instrument of J. L. Petit, and which was eulogized by Platner, appeared to be attended with too much inconvenience in the opinion of Le Dran, who maintains that the blunt-pointed

scissors will always answer, and that it is unnecessary to go to the extent of Dionis, by lacerating the wound with the finger, in order to enlarge it after the incision is made. The cleft spatula of Richter and Callisen, and the curved and blunt-pointed scissors invented by G. Schmitt, are not in use with us at the present day, though in fact they might be made to effect the object intended by their authors. M. Colombat, who is always ingenious in constructing new instruments, has proposed one, which appears to me altogether useless, as does also the excision which he recommends to be substituted in place of the simple incision.

B. *Operative Process.*—We adopt the method of Le Dran, that is to say, the infant being seated and its head held back by its nurse, or some other person who will not be disturbed by its cries, the surgeon raises up its tongue by means of one or two of the fingers of his left hand, while with the other hand holding a blunt-pointed scissors, he rapidly divides the frenum. But, inasmuch as the size of the fingers may frequently embarrass the remainder of the operation, we have generally made use, since the time of J. L. Petit, of a canulated sound, the cleft plate of which being substituted in their place, protects at the same time the vessels. When the filet is properly secured in the bifurcation of this plate, the operator slightly raises up its handle towards the forehead of the child, in order to push the tongue backwards and upwards. Then introducing the scissors underneath, he divides with a single cut the small membrane thus stretched, taking care to direct the point of the instrument slightly downwards, in order to be sure that he runs no risk of wounding the ranine arteries. The wound requires no precaution, and it is extremely rare that the little patient suffers any pain from it beyond a few hours. The movements of the organ prevent its reagglutination, and I am not aware that there is any necessity in this matter to touch it with nitrate of silver, as is recommended by M. Hervez de Chegoin.

C. *Accidents.*—*Tetanus*, which was produced by the section of the filet, in the child mentioned by J. Fabricius, and which operation had been performed by a charlatan, has never been observed since. According to some authors, two serious accidents, *hemorrhage* and *reversion of the tongue* into the pharynx, may however be caused by this operation. The first happened to Roonhuysen, who could not arrest the blood until he had applied vitriol to the bottom of the wound Maurain incurred still greater dangers, and was obliged to come to the actual cautery. J. L. Petit mentions two cases in which the operation having been badly performed, the patients would have evidently succumbed if he had not immediately afforded them relief. A circumstance which in these cases aggravates the danger is this, that the blood in place of being spit out, is swallowed in proportion as it flows, and that if we are not vigilant the child may die before we have suspected the cause.

I. If we employ the sound, and take the precaution to incise nearer the inferior wall of the mouth than to the tongue, it is next to impossible that such a hemorrhage can take place. If it should happen, however, it may be stopped by directing upon the point which bleeds the head of a probe heated to a white heat. J. L. Petit suc-

ceeded by means of a wooden fork an inch long protected by linen, and having its point d'appui against the inner side of the maxillary symphysis on the one part, on the other embracing the top of the wound, while a small band passed transversely in the mouth, then brought out and crossed under the jaw, and raised up above the ears to be fastened to the child's cap, hindered the tongue from moving. Two stems united in any manner whatever at their middle portion so as to form a forceps, by means of which the bleeding part should be seized, and which should be made to act by pushing a wedge between the two halves of its other extremity, would bring about the same object, and in fact attain it with still more certainty. The natural softness of the tissues, and the retraction of the arteries, would in general render the ligature recommended by Courtois wholly inapplicable.

II. As to the *reversion* of the tongue, the moderns have with difficulty admitted its possibility. J. L. Petit, who has seen three examples of it, explains it in saying that the frenum having been divided the tongue becomes free, is raised up and directed towards the windpipe with so much the more facility, because the infant, who, up to that time had not been able to seize hold of the nipple, now sucks upon it with a degree of voracity. In one case, this practitioner had three times to draw back the tongue out of the pharynx, but the fourth time the patient died notwithstanding. J. L. Petit has *seen* the reversion in question during life, and has *demonstrated* its existence after death. It is therefore an unquestionable fact. Nor can I see why it should be so difficult to comprehend, nor why we should call in doubt what travellers have said of those Eastern or African people, who, in order to escape severe punishments, killed themselves by *swallowing* their tongue. Any person may ascertain upon himself, that the tongue can be reversed to the upper part of the pharynx, and that there would be no very great difficulty in closing with it the posterior opening of the nasal fossæ. A similar fact to those of Petit, has moreover been related since by M. Cross, (*Presse Méd.*, t. I., p. 388.) We avoid this reversion by not dividing the filet too deeply. In order to remedy it we must bring back the tongue by means of the finger into its natural position, make the infant constantly suck so long as there is danger, and when it does not suck, keep its mouth carefully shut.

### § II.—*Anchyloglossis, (Adhesions of the Tongue.)*

Adhesions of the tongue have at every epoch attracted the attention of surgeons. Whether they be congenital or acquired, the result of simple inflammation or the product of more deep-seated lesions, ancient or recent, the cutting instrument is nevertheless the only resource for their relief. Aetius says that the abnormal membrane, or cicatrix, is to be seized with a hook, and to be then divided with the necessary precautions. J. Hellwig, having been consulted by an individual who could not articulate sounds, destroyed by dissection the adhesions of his tongue, and thus restored his speech. At the present day, we proceed in the same way. Only it is important that we should not allow ourselves to be imposed upon by an ar-

rangement that is sometimes met with in new-born infants. In such cases their tongue is merely glued (*collée*) either against the vault of the palate, as Louis has seen it, or to the lower wall of the mouth, which has caused more than one old grandmother to suppose that the child had no tongue. The finger, the handle of a scalpel, or the spatula, will be found sufficient to destroy this simple agglutination, which in fact is nothing more perhaps than the beginning of a true ankyloglossia. The method to be adopted would be still the same in an adult, if we should be called before the adhesions, which have been the result of a diffused inflammation, have acquired a certain degree of solidity.

A. If there should be only a few *bridles of slight extent* upon the sides of the frenum, we should divide them with the scissors, like the filet, and with the same precautions. We should divide in the same manner those which are not unfrequently found to have been formed between the cheeks and borders of the tongue, in consequence of mercurial gastritis and other phlegmasias of the mouth, examples of which have been communicated to the Academy by MM. Duval, Cullerier, and Bernard. Should they have a certain degree of breadth, they should be excised in place of simply dividing them. After having detached them from the buccal wall by one cut of the scissors, we should seize them near the tongue, in order to remove them by a second cut with the same instrument. We may also remove them by embracing them successively at their middle portion with the forceps, while we detach their borders with the scissors or bistoury.

B. When on the contrary these *adhesions* are close, or cellular, as it is termed, the dissection must be conducted with more particularity and caution. The surgeon being placed behind, and to the right of the patient, whose head is held back upon a pillow, the arm of the nurse, or against the chest of an assistant, endeavors to separate by means of the left forefinger, a spatula, or a portion of a sound, or any other suitable instrument, the free portion of the tongue from the point in the mouth which keeps it immovable. Dividing gradually with a straight bistoury held flatwise, all the lamellæ or unnatural attachments which he intends to destroy, and not forgetting, at the inferior region especially, slightly to incline the edge of his instrument towards the wall of the mouth, or to remove it as far as the state of the parts will permit from the body of the tongue itself, in order to avoid the vessels with greater certainty, he sponges up the blood in proportion as it runs out and stops from time to time, in order to afford the patient time to breathe and to have his mouth cleansed out. He then cauterizes with a hot iron if any hemorrhage exist, or in other cases prescribes some styptic or astringent lotions, and finishes by pressing his finger upon all the points of the wound in order to assure himself that there no longer exists any improper adhesion. Emollient gargles, extended and frequent movements of the tongue, and the precaution of frequently gliding the finger between the divided surfaces in order to prevent their reunion, are all that remains to be done until the cure is completed, which is usually accomplished from the fifth to the thirtieth day, but which requires all these attentions in order to be effected with certainty.

### § III.—*Tumors and Ablation of the Tongue.*

A. *Gangrene, induration, fungous* and schirrous tumors, cancerous ulcers and true *cancers*, are the principal diseases which may require amputation of the tongue either entire or in part. It is an operation which has been only lately introduced into practice. Deterred by the idea that the tongue is the exclusive organ of speech, although J. Lange asserts that he had already often removed it in consequence of gangrene, this operation was thought of only with dread, when Louis demonstrated that many individuals, though deprived of a large portion of this organ, nevertheless continued to have their speech and to distinguish the taste of different substances. The laborer mentioned by Roland de Saumur, and who had lost his tongue down to the root in consequence of gangrene, could speak, spit, swallow without difficulty, and taste different substances.

The young girl noticed at Lisbon, by De Jussieu; the Margaret Cutting mentioned in the Philosophical Transactions; the Marie Guillard referred to by Bonami and Louis; the girl, A. M. Federlin, whose history is published by Auran; the young man whose tongue was torn out by the corsairs because he would not be made a Mussulman, and whom Zulpius states he saw, and another person who had his tongue cut out by robbers, and whom Zacchias mentions to have seen, were cases of this description. It is also known that in Germany, Italy, Spain, &c., it has a long time been the practice to punish malefactors by cutting out their tongue but most of whom, notwithstanding, have retained the faculty of speech. All the world in fact are familiar with the two cases so quaintly described by A. Paré: 1st, of a mower, who after having been mute for the space of three years in consequence of having lost a portion of his tongue, being ridiculed by one of his comrades while he was holding a wooden vessel between his teeth, made an effort and uttered, to his great astonishment, a few words, and who, taking advantage of this circumstance, finally learned to speak distinctly by means of a saucer or small cup; 2d, of a young boy whose tongue had been cut off, and who recovered his speech by making use of the instrument invented by the preceding person. Though it be satisfactorily proved that the loss of the tongue does not always involve complete loss of speech, it is nevertheless true that its amputation has been more than once performed without any very evident necessity. We should dispense with it for example at the present day, and would not imitate Pimpernelle, (Bonet, *Corps de Méd.*, t. IV., p. 305.) even though the organ had become so much swollen as to protrude outside, unless it was accompanied at the same time with an actual schirrous or cancerous degenerescence. Serous cysts, abscesses and collections of blood might be laid open or excised without the necessity of extirpating the tongue. In a case cited by Thymœus, (*Ibid.*, t. III., p. 201,) and in another for which we are indebted to Bonavert, (*Trans. Philos. Abreg.*, t. IV., p. 340,) a tumor upon the tongue contained a stone of the size of an almond. A patient of Sedelius (Bonet, *Corps de Méd.*, t. IV., p. 62) presented the same phenomenon. Dumonceau (*Mém. de l'Acad. de Berlin*, t. VII., Append., p. 130) mentions that a retention of urine was not removed until after

the extraction of a stone which was found under the tongue, and we see also in a case of Leautaud (*Ibid.*) that a similar calculus had produced fever with an abundant salivation. In all cases of this kind we should never think of amputation of the tongue. It is an operation therefore which in the main must be reserved for cancerous tumors, and other degenerescences of bad character.

B. *Operative Process.*—The operation, moreover, is performed in quite a variety of modes, and should be modified in fact according as the disease presents itself on this or that part of the organ.

I. *Process of Faure.*—The erigne forceps or scissors curved flatwise, will answer for the excision of *pediculated tumors* of greater or less size, and which rarely appear upon the tongue except on its dorsal surface. The ligature would not have the same advantage, and however little of the disease we may apprehend to have left behind, it is important, in addition, to cauterize the bottom of the wound with a hot iron.

II. If the alteration should be confined to the tegumentary layer, it would be necessary, as Walée, after the manner of Bartholin, appears to have done long since, to remove only the degenerated lamellæ and to preserve the muscular tissue.

III. Should the *chancrous ulcer* be deeper and situated upon the borders of the tongue, we should then, in order to destroy it, no longer make use of the curved bistoury, as was done by a surgeon made mention of by Ruysch. The point of the tongue being wrapped in a dry piece of linen, is drawn to the outside by the hand of an assistant, who inclines it towards the side opposite to that of the disease. The operator, provided with a straight bistoury, commences by making an incision of several lines in extent on the lower surface and throughout the whole length of the organ; makes another on its dorsal surface; thus encircles the cancer, including with it a certain extent also of the sound parts; then secures it with the forceps or erigne, and promptly completes its excision. The actual cautery, without being really necessary, becomes a matter of importance at the termination of the operation, as in the preceding case. If, out of the three persons operated upon in this manner by M. Heyfelder, (*Journ. des Conn. Méd.*, t. II., p. 347,) a cure was effected only in one, it was certainly not the cautery which did it.

IV. *Ligature.*—When the *disorganization* is still deeper, when especially it has extended very far backwards, and that it, nevertheless, appears to be practicable to preserve one of the halves of the tongue, we may have recourse to the *ligature*. It would protect us with more certainty against hemorrhage than the bistoury, and nothing prevents us, if we apply it in a particular way, to go back with it nearly as far as the larynx. A tumor of a doubtful character, which was situated upon the side of the tongue and which was tied at the supra-hyoid region, and also at the mouth, was in this manner ultimately detached, resulting in the recovery of the patient, (*Arnolt, Gaz. Méd.*, 1839, p. 106.)

a. *Process of M. Mayor.*—The organ is first transfixed through the mouth, and at its most remote part, from below upwards and from before backwards, by a strong bistoury, which being brought forward divides its whole length into two equal parts without touch-

ing the neighboring arteries. The operator then adjusts, at a point beyond the disease and upon the affected portion, the noose of a strong ligature of thread, the two ends of which he passes separately through a metallic tube, of a square shape and pierced with two openings slightly convergent, then through the other pieces of the chaplet knot-tightener which I have spoken of in the chapter on ligature en masse; thus embracing the base of the flap which is to be destroyed, he turns the small winch, and when the constriction is carried as far as is desired he attaches the free portion of this apparatus to the labial commissure, either by means of a thread or a small band. The pressure is increased in the same manner daily, and even several times during the day. The tissues soon mortify, and either separate or may be excised without danger on the third or fourth day. The knot-tightener of M. Mayor, which has been employed in five instances with success by its inventor, and which is a real improvement upon the instrument devised by MM. Bouchet and Braun, has the advantage in consequence of its flexibility of adapting itself without difficulty to the inequalities of the tongue, of occasioning but very little inconvenience in the interior of the mouth, and of allowing of a constriction which is at the same time moderate, energetic, and permanent. Should it not be at hand, however, the knot-tightener of Desault or that of Levret might, in these cases, be employed here with full as much advantage as for the ligature of polypi in general.

b. If the *whole breadth of the tongue* is diseased, either at its point only or as far down nearly as its base, the ligature would still be applicable. The proof of this is demonstrated in the observations of La Motte and Godard, each in a different case. Ev. Home and Mirault (*Soc. de Méd. de Montpellier*, t. IV., p. 517,) passed a double ligature through the centre of the tongue and brought its two halves out, to be knotted upon the sides of the organ, which they succeeded in this manner in dividing and separating by suppuration. M. Galen-zowski (*Journ. de Progrès*, 2e série, t. I., p. 256,) in order to destroy a fungus hematodes which occupied one of the sides of the tongue employed a triple ligature and succeeded. In place of previously slitting through the tongue from before backwards, as is recommended by M. Mayor, M. Maingault (*Journ. de Prog.*, t. XIV., p. 511, 1re série,) proposes that we should apply the ligature by the mouth and pass it through each half of the tongue on its side, by means of the curved needle of Deschamps, which certainly would be preferable if it were possible to go far enough back.

c. *By the supra-hyoid region.*—I have elsewhere described, (*Arch. Gen. de Méd.*, 2e sér., t. V., p. 638,) after having seen the operation made trial of by M. J. Cloquet, another process, since improved by M. Mirault, the son, (*Mém. de l' Acad. Roy. de Méd.*, Paris, 1835, t. IV., p. 35.) An incision between the os hyoides and the chin enables us to introduce in this manner, from below upwards and from before backwards, through the base of the tongue, a double ligature which is to be turned one on either side, upon each half of the organ, in order to bring them out through the same opening below, and to fix them with a knot-tightener under the jaw.

V. So long as the *tumor does not extend too far backwards*, and

that it retains a small portion of sound tissues upon its borders, *excision* with the cutting instrument is preferable. *Louis* recommended, after the manner of the ancients, that after having hooked the tongue by means of an erigne forceps, or the forceps of Museux for example, we should amputate it by merely cutting through it simply and transversely with the bistoury.

VI. At the present time we adopt a much more rational process. The surgeon having seized the morbid mass with a strong erigne or hook forceps, draws it out of the mouth with one hand, circumscribes and removes it with the other by means of two cuts of the scissors, making a V incision through the sound parts, and the point of which faces backwards and is to fall upon the median line. Immediately approximating the two sides of the wound, they are to be united by three points of suture, one on the dorsal surface, a second at its point, and the third on its lower surface. The agglutination is often completed by the second day. The threads may be withdrawn on the third or fourth day, and the cure is generally completed from the eighth to the tenth. This is what has been seen to take place by Boyer and M. Langenbeck, and what I myself have witnessed. In this manner the deformity is reduced to as slight a degree as possible, and the accurate coaptation of the bleeding surfaces so frequently of itself arrests the hemorrhage that it becomes unnecessary to recur to any other hemostatic means.

VII. *Process of the Author.*—Whatever process may be preferred, a noose of thread passed through the point of the organ always simplifies the operation. By means of this noose the surgeon does with the tongue what he pleases; he draws it out, relaxes it, depresses or elevates it, and directs it to the right or to the left, without in any way interfering with the movement of the instruments. M. Diffenbach, (*Gaz. Méd.*, 1838, p. 808,) who employs two nooses of this description, passes them behind the tumor and not near the point of the organ. Since the year 1831 I have employed them in ten cases, and I cannot too highly recommend them to the use of practitioners. M. Graefe (*Bull. de Fér.*, t. XX., p. 211,) and M. Delhaye (*Journ. Univers. Hebdom.*, t. IX., p. 20, 1832), have been equally well satisfied with them. If the tumor does not occupy the end of the tongue, and should it be found nearer the middle than the border of the tongue, after making use of this precaution, I hook the degenerate portion with an erigne in order to stretch it and encircle it in an ellipse by two semilunar incisions. Should it become necessary to remove one half of the organ, I first detach its lower surface transversely by a cut of the bistoury. The instrument then being immediately carried behind and beyond the limits of the disease, enables me to divide the tissues from above downwards with a second cut, which terminates the operation. It would be difficult to find a more simple mode or one that is more generally applicable.

C. *Appreciation.*—Transverse amputation of the tongue therefore should be reserved for those cases in which there is no opportunity for the formation of lateral flaps. The dividing the tumor by a crucial incision and then cauterizing its bottom, as Delpach did, (*Rev. Méd.*, 1832, t. II., p. 384,) is an objectionable process, which would be applicable only to cysts of a benign nature. The method of

Jaeger (*Journ. des Conn. Méd. Chir.*, t. I., p. 347), is too complicated, and requires too many instruments to find any advocates. The previous ligature upon the lingual artery, as practised by M. Flaubert, and which M. Mirault has made trial of, would not be useful except, if instead of the ligature en masse, we intended to make the excision at a very remote point upon the tongue. It is also with difficulty that I can comprehend why M. Regnoli, (*Gaz. Méd.*, 1838, p. 796,) in order to extirpate a tumor from the tongue should have found it necessary to incise the entire supra-hyoïd region and to draw out the tongue through this opening, though the young girl, who was fourteen years of age, was cured.

D. When *hypertrophy* only exists, *compression*, as employed successfully by Freteau, (*Bull. de la Fac. de Méd.*, t. V., p. 264) Delpech (*Revue Méd.*, 1835, t. I., pp. 330-337,) and many others, will almost always answer. M. Rey, (*Ibid.*, 1835, t. I., pp. 330-337,) who, in a case of this kind, states that he was obliged to have resort in one instance to the V excision, adds that the operation of Mirault, the father, was also performed for a hypertrophy, and not for a cancerous tumor. It is quite remarkable that M. Harris (*Bull. de Fér.*, t. XXVI., p. 93), and M. Mussey, (*Gaz. Méd.*, 1838, p. 394,) who believe themselves to have been the first who employed this process, should also have been under the necessity of making use of the V excision to cure a chronic tumefaction of the tongue. As to the rest, every tumor, whether scirrhouς or carcinomatous, which does not penetrate too deeply and which projects at the periphery of the tongue, may be readily destroyed by the process of Faure or Louis, that is to say, by means of the scissors curved flatwise and the actual cautery. Those on the contrary, which, extending to the muscular tissue, are seen upon the surface or on one of the borders, without reaching too great a distance posteriorly, and which have not invaded either the entire breadth or thickness of the organ, require the employment of the bistoury by the process which I have pointed out, and which is somewhat analogous to the method of P. le Mnémonite. If the disease, though much extended on the surface, continues to be superficial, and that the tissues beneath it are sound, we must follow the indication given by Vallée and dissect and remove everything which is diseased, and respect and preserve everything which is not so. If it becomes necessary to destroy an entire half of the tongue, including therein its base, the ligature by the process of M. Mayor becomes applicable and even appears to me to be preferable to that of M. Mirault, while, should it become requisite to remove the whole tongue, the process of Home ought to have the preference, as well as in all those cases in which excision, after the manner of Boyer, is not sufficient for removing the tumor and central degenerescence. It is necessary to be remarked however, that in the process of M. J. Cloquet or M. Mirault, as well as in that of M. Maingault, there is no necessity of slitting up the whole length of the tongue before strangulating its base. I will add, in the patient of the surgeon of Angers, the ligature, by embedding itself into the tissues, became imprisoned there by allowing them to reunite over it in place of mortifying them; the tumor nevertheless was removed

and the tongue remained entire. As to the process of M. Regnoli, I do not know what to say of it.

*E. Subsequent Treatment.*—It is extremely rare, as has been shown by Tarbès, (*Clin des Hôp.*, t. II., p. 41,) that we are under the necessity, after these different kinds of operations, of having recourse to the various objects of dressing. If the contrary should be the case, the gusset (gousset) of Pibrac might become useful. Upon the supposition that there should occur an unpleasant hemorrhage, or one which the means above pointed out could not have effectually arrested, we should then have to have recourse to the ligature. In such cases we should be obliged to look for the lingual artery at its passage above the os hyoides, unless that the carotid itself would not also have to be included in the thread. It would, in fact, be advisable to commence there if the tongue was to be amputated near its root with the cutting instrument.

#### § IV.—*Palate.*

The mouth and the palate, as well as tongue and cheeks, sometimes contain *calculi*. Kruger (*Mém. de l'Acad. de Berlin*, t. VII., App., p. 130,) says he extracted a calculus from an abscess in the palate. A stone came out from the internal surface of the masseter in a patient mentioned by D. Pomarest, (*Bonet, Corps de Méd.*, t. IV., p. 102.) The vault of the palate is sometimes also the seat of *fibrous* or cancerous tumors. I have already given two examples of these in the chapter on tumors. M. Guyot (*Bull. de Fér.*, t. II., p. 262,) has successfully extirpated tumors of this kind, which did not differ from ordinary cancers. I have met many instances of those which, of the size of the thumb or a small egg, presented all the characters of fibrous tumors, and were solidly adherent to the bones. To remove them, all that is necessary would be, after having hooked them with an erigine, to dissect them with care, and afterwards to cauterize the wound with the red hot iron should any hemorrhage threaten.

### ARTICLE IX.—POSTERIOR FAUCES, (Isthme du Gosier.)

#### § I.—*Hypertrophied Tonsils.*

The tonsils, after repeated inflammations, frequently remain so large as to interfere with deglutition, hearing and respiration. The induration they acquire at the same time, is the reason why for centuries past it has been believed that they had passed into the state of scirrhus. But since the time of Claudinus, and especially of B. Bell, the falsity of this opinion, which I am surprised to see revived in some modern works, has been generally acknowledged. All surgeons at the present time know that induration of the tonsils, with tumefaction, is nothing else but an hypertrophy, and that it never, or almost never, gives rise to scirrhus or cancer. The treatment which has been applied to it has greatly varied. Without mentioning scarifications, eulogized by Asclepiades, Celsus, Heister and Maurain, as well as by some of the moderns, and among others M. H. Berard,

(Fabre, *Thèse*, No. 133, Paris, 1832,) it has been attacked also by cauterization, the ligature, extirpation and excision.

A. *Cauterization*.—Mesué, who appears to have been the first who ventured to apply caustics to the tonsils, made use of the actual cautery. Brunus adopted the same practice, at least when it was his intention to destroy the whole disease. Mercatus, who followed, made use of a gold cautery moderately heated, and which he conducted through a canula. M. A. Severin, less exacting than Mercatus, contented himself with an iron instrument, and did not have recourse to it any more than his friend Aflisius, except for tonsils with a large base. Wiseman, after having mentioned that Ed. Mol very successfully cauterized the tonsils by perforating them at several times with a red hot iron, nevertheless confesses that he prefers the employment of escharotics, which Junker, Heister and Freind also advise, under various forms. The lapis infernalis, successfully employed by Morand, is also sometimes in usage at the present day, but it possesses no advantage any more than sulphate of iron, copper or alumine, except in cases where the induration is recent and of but little extent. MM. Perronneaux, Roger, Sarmento, Quotard, and F. Hatin, who following MM. Bretonneau, Toirac, Guillon and myself, have proposed nitrate of silver against acute anginas, have also devised for this purpose caustic holders, which might possess some advantage, especially that of M. Sarmento. The red hot iron, which Louis seems to prefer, and which should be adopted if it was proposed to cauterize vigorously, is evidently applicable only to fungous tonsils, and in cases in which we were fearful of having left behind a portion of what we intended to have removed, and of seeing the disease repullulate and the blood escape in too large a quantity after the excision. But as these different circumstances, pointed out by Percy and Boyer, are but rare exceptions, it follows, even on receiving them as facts, that cauterization ought scarcely ever to be resorted to.

B. *The ligature*, devised for the purpose of avoiding hemorrhage with greater certainty, and giving less dread to the patient, and which has been a long time employed in France, had not, however, been distinctly recommended by any person before the time of Guillemeau, who, in order to apply it, made use of a sort of knot-tightening forceps arranged with considerable ingenuity. F. de Hilden is the second author who recommends it. The canula, provided with a canulated ring, and which he invented for this purpose, in order to conduct and tighten the thread, and which instrument has been revived as a new one by M. Smith, (*Journ. de Prog.*, etc., t. VI., p. 275,) has not been adopted any more than the instrument of Guillemeau. Cheselden, one of its principal partisans, applied it by means of a simple sound in cases where the tumor is as it were pediculated. In other cases, he passed a double thread through the gland by means of a curved needle, in order to strangulate the two halves separately. Sharp operated exclusively in this manner, which Lecat, following Castellanus, Levret and Heuermann, has modified in this point, particularly that from the color of his two strands of thread, being different, it is never possible to mistake them. Bell made use of a silver wire or catgut; inserted it in a slightly curved canula, which he introduced to the top of the pharynx through the corresponding nasal

fossa; extended its noose with the finger, placed it around the tonsil, and used his canula as a knot-tightener. Desault was satisfied with a Brittany thread conducted through the mouth upon a double erigne, and fastened by means of his ordinary knot-tightener. Before him Heuermann had maintained that the polypus instruments of Levret are those which are the best for this ligature, which, however, may be equally well applied by means of the chaplet instrument of M. Mayor, or after the manner of C. Siebold, by means of a silver wire introduced with the forceps. The inconveniences of the ligature, which had already been noticed by Van Swieten and Moscati, are so obvious to every person, and are so inherent in the operation itself, that no one now employs it, notwithstanding the successes attributed to it by Physick, so that it becomes difficult to understand the efforts made use of in England by MM. Chevallier and C. Bell to bring it again into repute.

C. *Extirpation*, which Celsus appears to have pointed out in these words: *oportet digito circumradere (tonsillas) et evellere*, was positively recommended by Paul of Egina, *ipsam totam (tonsillam) ex fundo per scapellum resecamus*, who performed it with a curved bistoury. Ali-Abbas had invented for this purpose a sort of hook which is called *senora*, and Abu'l Kasem a small knife in the form of a sickle. In the place of the *ankylotome* of Paul, J. Fabricius advises that we should first isolate the gland by means of an elevator, then seize it with the forceps and draw upon it adroitly in order that it may yield without difficulty, he says, and as it were of its own accord. It would be practicable, if it were necessary, to tear out the tonsils by enucleating them with the nail and finger, as was probably done in the time of Celsus; but this would be unnecessarily augmenting the sufferings of the patient, and any person may comprehend that such an eradication must necessarily be dangerous. Moreover, extirpation of the tonsils is entirely useless, and excision has long since been substituted for it. If, however, we should decide upon performing it, nothing would be more simple. An erigne, or the forceps of Museux, to draw and disengage the gland from between the pillars of the velum palati; and a narrow and blunt-pointed bistoury to divide it at its root, would answer, as in ordinary excision. Only we must take care not to go beyond the lateral limits of the pharynx, for then the venous plexus, or some vessels still more important, the carotid, for example, which is found on the sides of this muscular funnel, might become wounded, and give rise to a formidable hemorrhage.

D. *Excision*.—Though Aetius appears to have been the first who formally announced that we must only remove the prominent portion of the tonsils, and never extirpate them, excision nevertheless had been recommended before him. The operation which Asclepiades designates under the name of homiotome, cannot be any other thing. Has not Celsus also described it in this phrase? *Si ne sic quidem resolvuntur, hamulo excipere et scapello excidere*. Those who since then have adopted it, have almost all of them endeavored to modify the process. Rhazes says that we should seize the tumor with an erigne, and retrench the fourth part of it; but according to him, it is an operation so dangerous that we ought rather to recur to broncho-

tomy. *Wiseman*, instead of using the hook and ankylotome of the ancients, or the curved bistoury and double erigne of *Mesuc*, commenced by ligating the tonsil, and afterwards made use of the thread as an erigne, while he was excising the gland with the scissors. *Moscati*, who was at first a partisan of the ligature, which had already been proscribed by Cavallini, and who at a subsequent period practised excision with a curved bistoury, fixed upon a blade of wood, afterwards adopted another process: he commenced by making a crucial incision into the tonsil by means of a convex bistoury, after which he excised its four flaps separately, taking care to leave an interval of three or four days between each operation. *Maurain*, who properly censures the method of Moscati, recommends with Levret that we should remove with a single cut the entire tumor, by means of curved scissors made expressly for the purpose. *Lecat* went back to the double erigne of Heister, and recommended a small concave knife with a blunt point, or curved and blunt scissors. At the same epoch Foubert recommended that we should embrace the gland with a polypus forceps, and make strong traction upon it in order to contuse the vessels while we were excising it with a single cut of the bistoury. *Caqué* greatly extols the simple erigne, then a blunt-pointed knife with a cutting edge which is almost straight, and bent into an angle upon its handle. *Louis* asserts that the ordinary bistoury will answer, and that if we divide the gland from below upwards, we shall be sure to prevent it from reversing itself upon the opening of the larynx, and exposing the patient to suffocation, as in the cases which gave so much alarm to Wiseman and Moscati. *Museux* invented for this operation the forceps which bear his name, and maintained that when the tonsil is once seized hold of with this instrument, it is no longer possible for it to escape. *Desault* gave the preference to the ordinary double erigne, and the *kiotome*. Desault's instrument, though ingenious, is no longer employed. The blunt-pointed, straight bistoury is infinitely more convenient, and, as Boyer has remarked, in every respect deserves the preference. The reason why authors have varied so much in the manner of performing so simple an operation, is because, in intractable persons, children for example, and those whose mouth also is small and deep, or who open it with difficulty, it is sometimes attended with considerable embarrassment. A glance at the stages which compose the operation will enable me, I hope, to reduce to their just value the principal precepts of the surgeons who have just been cited.

I. *Speculum oris and depressors of the tongue*.—The first thing to be attended to is to keep the mouth of the patient open, and to control the movements of the tongue, from whence comes the different glossocatoches of the ancients, and the various kinds of *specula*, which followed from the time of A. Paré down to our epoch; from whence also comes the chevalet, the handle of which, curved in the shape of an S, enabled Caqué to draw the labial commissure backwards, and to keep the jaws separated; and the silver plate which was applied on the tongue, while its handle, a little more elevated, rests upon the lower dental arcade, which it permits us to depress; also that other instrument more complicated, proposed by M. Lemaistre, and afterwards by M. Garnier, and which, without interfering with the move-

ments of the operator, has the effect to keep the mouth firmly open and the tongue depressed ; the plate of box-wood, or of ebony, bent at a right angle, and in other respects quite similar to the horn, which is used for raising up the heel of the shoe in putting it on, and which MM. Roche and Sanson consider very useful ; from hence comes also the instrument of M. Colombat, the annular wedge of M. Saint-Yves, and the long handle with a disc of M. A. Bérard, &c. But a myrtle-leaf, or a spatula, the handle of a silver spoon, the finger, or a piece of cork, are full as good, and less embarrassing than those ingenious inventions, when we are actually under the necessity of attending to the mouth or tongue in this respect.

II. *To secure the tonsil.*—The *previous ligature* of Wiseman is evidently a method more fatiguing than excision itself. As to the erigne, it is to be apprehended, it is said, that if it is single it may lacerate the tissues and escape ; that it is attended with too much difficulty to insert it on the contrary if it is double, or especially quadruple, as in the *forceps of Museux*. It is also objected to these last, that they interfere by their size with the movement of the other instruments, and that they are not easily supported by the patient. Finally, the *erigne* with three points, devised by *M. Marjolin*, would be still more embarrassing if it was necessary to disengage it before the end of the operation, than the instrument of the surgeon of Rheims. There can be no doubt that there is some truth in these objections, though most of the inconveniences pointed out are trifling. After all, the choice of the *erigne* is not here a matter of importance ; provided that that which is single possesses a certain degree of solidity, that it has an arc of a certain extent, and seizes the gland behind, at the union of its outer third with its two inner thirds, it will enable us to make traction upon it with as much force, and with as little laceration of the tissues as a double *erigne*. *Louis* has had no reason to be dissatisfied with it, and I on my part have found it very useful in practice. The double *erigne* also, which was still used by Desault and Boyer, has no other inconvenience, in my opinion, than that of being a little more difficult to adjust. The *forceps of Museux*, though less easy of management, but preferred by Dupuytren, possess an advantage which is not found in the *erigne* of *M. Marjolin* ; which is, of not incurring the risk when we withdraw them, of wounding the different parts of the mouth. The *erigne-forceps* of *M. Ricord* have no advantage over those of *M. Marjolin*. The same may be said of the *polypus forceps* of the shape of an *L* of *M. Chauvet*, those of *M. Saint-Yves*, and the *erigne* with four hooks of *M. Baudens*.

III. *The large blunt or probe-pointed bistouries*, and which are curved or straight, with a spring or fixed handle, being merely a reproduction of the ancient instruments, are entirely unnecessary, though they have been proposed by MM. Blandin, Amussat, Ricord, Baudens, and myself. As to the *cutting instrument*, the only choice at the present day is between the scissors and the probe-pointed *bistouri*. With the first we are more certain, especially in selecting the scissors with blunt or probe points curved on their flat side, particularly the *scissors of M. J. Cloquet*, (*Arch. Gén. de Méd.*, 2<sup>e</sup> sér., t. II., p. 124,) of removing nothing which we wish to pre-

serve. But the section which they make has less neatness, and they occupy somewhat more space in the pharynx and mouth than the bistoury. The gland, moreover, when pressed upon between their branches sometimes escapes from them, and compels us to make several cuts before we can divide it. In respect to the bistoury, if there is no longer any question except of those which are terminated by a blunt or rounded point, it is because that with the others we might easily wound the posterior wall of the pharynx, and with much facility also perforate its outer wall. Caqué's knife is too large, and the straight and narrowest bistoury is unquestionably the best that can be made use of. If the kiotome had not been recommended by a man so celebrated as Desault, and had been represented in a less favorable light by M. S. Cooper, it would scarcely have deserved to be mentioned.

IV. The instruments being once selected, it remains to know in what manner the excision should be performed. In making this excision from above downwards, as some have recommended, it is to be feared that the bistoury might end by wounding the base of the tongue, and that if the *gland* holds only by a pedicle, it may escape and be *reversed upon the larynx*; but it would then be so easy by passing the finger into the throat to bring it back into the mouth and to complete its extraction, that this difficulty, which had like to have happened to Wiseman and Moscati, is in fact rarely to be apprehended. Louis, who had a dread of it, says, that by cutting from below upwards, there would be no danger of such an accident, and that the tongue itself would thereby be protected from any injury. In acknowledging the justice of this principle, Boyer and Marjolin concluded nevertheless to adopt it only in part. According to them, if we run no risk of wounding the tongue, it is not the same with the velum palati, and to avoid also this last inconvenience they follow the recommendation of Richter, and first incise from above downwards, then from below upwards, terminating at the middle part of the tumor. I see nothing to censure in these precautions only that they are useless. M. Roux usually operates like Louis, and has no reason to be dissatisfied with his process. Up to the present time I have had no reason to find fault with it; provided we take care to make the tonsil sufficiently prominent by drawing it towards us, and by slightly pressing it with the flat of the instrument against the arches of the palate, as if for the purpose of grazing its curve, we obtain one of the neatest and most rapid sections possible, without having in reality any thing to apprehend.

a. *Ordinary Process.*—The patient being placed upon a chair in front of a window properly lighted, is to have the head steadied and more or less turned back by an assistant. The surgeon placed in front, after having properly shaped a piece of cork, inserts it as far in as possible, and adjusts it vertically between the molar teeth on one side, in order to keep the jaws apart. Having caused the tongue to be depressed should it be in the way, and the commissure of the lips to be drawn backwards and outwards, the tonsil is to be secured and firmly embraced by the erigine at its postero-inferior portion, with the left hand for the left side, and with the right hand for the right side. After having drawn it out and disengaged it from

between the arches, he takes in his other hand the bistoury, which has been wrapped in a linen band up to within ten or fifteen lines from its point; then passes it between the erigne and the tongue, under the base of the gland; turns its cutting edge upwards, and cuts on its whole length by saw-like movements, as if in order to make it describe the arc of a circle, which is to finish at the base of the uvula, and in this manner separates with a single cut the entire hypertrophied portion of the tumor. Withdrawing at the same time the bistoury, the erigne and the excised mass, he immediately removes from between the jaws the cork which is fatiguing them, then makes the patient spit out and gives him cold water, or vinegar and water, to rinse out his mouth and to gargle. If one of the tonsils only was affected the operation is finished. When both are diseased we wait a few minutes; the blood ceases to flow, and we proceed after the same precepts to the excision of the other. We may in fact not remove them until after an interval of some days, should the patient be too much fatigued or absolutely desire it; but in general they prefer to be operated on at the same sitting rather than have it repeated after an interval of time, and the pain that they experience is in general so trivial that they can support it without any very great dread.

*b. Process of the Author.*—In tractable or reasonable persons, the process that I follow by preference, differs from the preceding in these particulars:—1. I place nothing around the bistoury or between the teeth. 2. I require no person to depress the tongue. 3. I make use of the simple erigne, possessing some degree of strength, and properly curved into an arc or hook. I hold the mouth of the patient open, and depress his tongue with the forefinger if I find it necessary. I then immediately plunge the point of the erigne into the body of the tonsil, from behind forwards, and from within outwards. The tractions I afterwards make upon the tumor to bring it towards the side of the mouth and uvula, force the patient to open his jaws, by paralyzing the contractions of the tongue. Making use of it as a guide to the bistoury, which I glide in flatwise, the back part first between it and the dorsum of the tongue, the erigne enables me to direct the instrument with certainty, and without having any need of seeing it as far back as to the bottom of the pharynx, to elevate its cutting edge when it is properly adjusted, and to terminate the operation while the wrist is inclined outwards, in as little time and with as little embarrassment to the patient as possible. It is entirely useless to wrap up the heel of the bistoury; but if we should take this precaution, it would be better to make use of a strip of adhesive plaster than a linen band.

*c. Another process of the Author.*—The operation I have just described is so simple and easy, that I can scarcely see any reason for simplifying it more. To effect this object however, new instruments have been devised, which may possess some advantages. In order to improve the kiotome of Desault, Physick, M. Warren, M. Fahnestock, in America, and M. Toirac in France, have each one for the purpose of dividing the tonsil, proposed a sort of guillotine, which is constructed with a ring to embrace the gland, and with a movable blade in the form of a large arrow, in those of MM. Warren and

Toirac, and in form of a circle in that of M. Fahnestock. The one which I make use of, after having modified it, bears a ring near its handle, and also a shifting and sliding point, (*pique à bascule et à coulisse,*) in order to raise up and fix the body which is to be excised. This instrument being introduced open in the manner of a spoon to the bottom of the mouth, serves very well to embrace the tonsil, the summit of which is immediately transfixed by the point, which must be made to slide an inch backwards; by pressing on the ring of this point, we draw into the ring as much as we wish of the tonsil. We then draw rapidly the cutting circle of the tonsillitome with one hand, while we steady its shaft with the other, which terminates the operation. This is an instrument which should be preserved for children, intractable persons, and those who open their mouth with difficulty, and also for surgeons who are not accustomed to operations.

V. *Subsequent Treatment.*—If the bleeding should not immediately cease, a solution of alum, eau de Rabel, or any other styptic liquor should be immediately given as a gargle, or should be applied naked to the wound by means of a forceps, if it were necessary to make it very active or concentrated. In cases of imminent danger, the actual cautery constitutes a last resource, which must not be neglected, and which is much more efficacious than the very complicated mode of compression proposed by Jourdain, or the agaric holder of M. Hervez de Chegoin. In an adult whom I operated upon in the beginning of 1831, at the house of Mad. Reboul, the loss of blood was so considerable at the expiration of two hours, that it became necessary to apply powdered alum immediately upon the wound. I have seen the same thing since in one of my patients, and in another who had been operated upon in the medical wards at the Hospital of La Charité. If some inexpert person should have opened the carotid, as Ténon or Portal, and A. Burns, Béclard and Barclay state that they have seen, the ligature upon the primitive trunk alone would still offer some chance of recovery. A frightful hemorrhage followed some scarifications which had been made upon the tonsils, and the woman was dead when M. Champion came to visit her. In respect to the remainder of the treatment, it consists of emollient gargles and diluent drinks; and the diet of broths and light soups, and afterwards food that is somewhat more generous. In general, scarcely any fever supervenes, and at the fourth or fifth day the health is in a great measure re-established.

## § II.—*Abscesses and Incision of the Tonsil.*

The surgeon is sometimes called upon to lay open with the instrument abscesses which form in the substance of the tonsils, as the result of phlegmonous inflammation. The sharp-pointed knife of Hippocrates and Celsus, the long bistoury and needle used by Leonidas, the razor of Lanfranc, the small piece of polished wood of Platner, the sagittella of Arcularius, the bird-beaked bistoury devised by Vigo, the pharyngotome of J. L. Petit, that of Jourdain, and the lancet of Roger of Parma, are, when it becomes advisable to perform this small operation, all advantageously replaced by the ordinary bistoury, when it is required to perform this small operation. Pressure with

the finger, a stroke with the nail, or an emetic properly administered, also very frequently answer. We also hold the mouth and patient in the same manner as for the excision of the tonsils, and the bistoury is to be wrapped in a strip of plaster to six lines from its point before we should undertake to plunge it into the abscess. The laying open of collections which are sometimes formed in the substance of the velum palati, in the uvula and walls of the pharynx, or even at the base of the tongue, is performed with the same precautions, and requires no other attentions.

### § III.—*Cancer of the Tonsils.*

Because cancer of the tonsils is rare, we must not therefore conclude that it is never met with. I have already encountered five cases, all belonging to the class of encephaloid cancers. Their situation and their relations with the large vessels of the neck have hitherto intimidated surgeons and prevented them from meddling with them. I have however in one instance extirpated a cancer of the tonsil in 1836, at the hospital of La Charité, and I did not find the operation very difficult. The patient, who was a countryman of 68 years of age, had suffered from his left tonsil for the space of two years; the tumor, which was bleeding, and already ulcerated and in a putrilaginous (putrilagineuse) state, almost completely filled up the pharynx, occupied a part of the nasal fossæ, and crowded forward the velum palati; suffocation was imminent. Having laid bare the primitive carotid, and passed a thread under it, as a precautionary ligature, I secured the tumor very far back by means of a double erigine, and drew it strongly forwards towards the median line. A small knife curved flatwise and with a fixed handle, then enabled me to lay open the left side of the velum and to extirpate the entire tumor from below upwards, and from within outwards. Perceiving the hemorrhage was trifling, I proceeded without stopping, and by another external wound, to the removal of a degenerate lymphatic ganglion, which lay against the pharynx in the lower part of the parotid region. The precautionary ligature became useless, and I removed it on the following day; at first nothing unpleasant occurred, and the wound had become cleansed, when a diarrhea with adynamia, and symptoms of purulent infection, developed themselves on the 10th day, ending in death on the 17th. An examination of the parts showed that there was nothing of a cancerous nature either on the inner or outer side of the pharynx, and that all the large vessels had been respected. The wounds were in great part cicatrized, and we found no appreciable lesion in the viscera; the large intestine alone appearing to be inflamed. This unfortunate termination, nevertheless, proves that the operation is possible, and that there may be sometimes occasion for undertaking removal of cancers of the throat like those of other organs.

### § IV.—*Excision of the Uvula.*

The elongation of the uvula, either by infiltration, inflammation or degenerescence, was an affection which the ancients paid much more attention to than the moderns, and which perhaps, merits more

attention than is generally accorded to it at the present day. In consequence of its contact with the base of the tongue, the apex of the uvula produces a most unpleasant titillation (agacement) in the throat, causes sometimes symptoms which appear to be connected with affections of a much more serious character, as for example, gastritis and phthisis, and which might lead to the commission of dangerous errors in the diagnosis, as well as in the treatment, if the surgeon should be ignorant of these circumstances. Consequently it is important that we should not wait too long before applying a remedy for the alterations of the uvula, and that we should not forget that its ablation is frequently, as Physick and Beckern moreover have shown, the only means of curing certain obstinate symptoms, which might lead to the supposition that there existed a serious malady.

A. *Cauterization*.—Its inflammation even when acute, should it have yet made but little progress, very readily yields to cauterization with nitrate of silver. I have used it like M. Toriac in many cases, and have had every reason to be satisfied with it. The melange eulogized by Demosthenes, and the caustics proposed by Galen, are at most applicable to cases of serous infiltration. The gold or iron cauteries made use of by Montagnana and Arculanus, the nitric and sulphuric acids employed by Vigier and Nuck, are very properly abandoned. Nobody at the present day would venture to imitate the absurd advice given by Mesué, and afterwards revived by Nuck and Bass, that is to say, to make traction upon the hair of the head to such degree as to tear the skin from the cranium, after having tied them with a ribbon near their roots, and united them together into a topknot.

B. *Astringents*.—Sal-ammoniac and the gall-nut according to S. Largus, the green shell of walnuts according to Galen, burnt alum mentioned by Rhazes, and pepper or ginger still recommended by Purmann, are scarcely in use at the present time, except by old women and country people, who, when the uvula is *down*, believe also that they can raise it up by placing under it a silver tea-spoon heated to a very considerable degree.

C. The *ligature* applied to the base of the uvula by means of the canulated ring of Castellanus, as Paré recommends, or by the ligature-holder of F. de Hilden and Scultetus, or in any other manner, though not as dangerous as Dionis considers, is nevertheless useless, and excision with a cutting instrument is the only means, which at the present day is resorted to for the chronic lesions, which have caused the elongation, or what is called the falling down of the uvula.

D. *Excision*.—It is moreover an operation which has been performed at every epoch, and in quite a great variety of modes. Hippocrates treats of it and recommends that it should be done with address; Celsus and Galen followed the same process. Paul had instruments expressly made for it; a *staphylagrum* to hold the organ, a *staphylotome* to divide it, and a *staphylocaustum* to cauterize the wound. He also speaks of another instrument invented by Serapion. Mesué, who proscribes the entire removal of the uvula, excised it with a gold bistoury heated at the fire, after having secured it in the ring of a sheath made expressly for this purpose.

In place of this sheath, G. de Salicet recommends that we should make use of a tube of elder, in which he placed the uvula in order to divide it, either by means of the hot iron or with the common bistoury. Guy de Chauliac recommends a forceps or an erigne, a concave bistoury or scissors. The scissors, without forceps or erigne, answered with J. Fabricius, who afterwards cauterized the wound in order to re-excite its vitality. A Norwegian peasant named Thorbern, devised an instrument somewhat similar to that of Mesué and Arnaud, that is to say, a species of kioto, which is opened in order that the uvula may become secured in a circular perforation placed near its extremity, and which it is only necessary to allow to shut up of itself for the excision to be instantly effected. Job-a-Meckren, who has seen the uvula extend as far as the lips, considers that we can use nothing more convenient than the scissors with long blades. Thorbern's instrument, improved by Raw, and soon after revived by Bass, under the form of a spatula provided with a cutting tongue, did not prevent Fritze from attempting still another modification to it since. Levret, who was also an advocate of the ligature, has eulogized scissors with a concave cutting edge, the same as for the tonsils and also polypus forceps. Richter found that scissors with a blunt point answered the purpose very well, and B. Bell had adopted a curved blunt-pointed bistoury nearly similar to that of Pott for hernia. The scissors of Percy, however, for the excision of the uvula are those which have been constructed with the most ingenuity and simplicity; a prolongation of three to four lines bent into a right angle terminates one of their blades, and prevents the uvula from making its escape from them, as soon as it has been secured. The only objection to them, as well as to most of the inventions mentioned above, is that they are not indispensable, and can be made use of only for this purpose; from whence it follows, that the new staphylotomes proposed by MM. Rousseau and Benatti are also useless instruments. A slender ring-forceps with very long handles, and with its beak armed with three mice-teeth, is preferable to all the others.

E. *Operative Process.*—The patient is placed in the same manner as for excision of the tonsils. The surgeon having in his left hand a fine erigne, or a dressing, or polypus, or the claw forceps which I have described, secures the uvula, inclines it forwards and a little to the right, and then with a straight and blunt-pointed scissors divides it with a single cut at some distance from its base.

F. It is not under the idle pretext of preventing it from falling into the larynx that we endeavor, in the first place, to secure the uvula, but because from its being supple and very movable it might, without that precaution, escape from the blades of the instrument. Oribases, Rhazes, Avenzoar, &c., were wrong in saying that its entire ablation is dangerous, and that it always alters the respiration and voice. S. Braun is still further from the truth in asserting that it constantly produces loss of speech. The case cited by Wedel, and which tends to prove that the aliments and the drinks then ascend through the nose, is evidently only an exception. The observations of Scheffer, Becken, Myrrhen, and Physick, and those of my own, satisfactorily prove that the loss of an organ like this rarely

produces any disturbance in the organism. It is better even to take away too much than too little, in order that we may not be obliged to repeat the operation; moreover the disengorgement which soon takes place, causes the uvula, whose base was more or less concealed in the velum of the palate, ultimately to become much longer than would have been at first supposed.

### § V.—*Staphyloraphy.*

Abnormal divisions of the velum palati are, as in the lips, sometimes congenital and sometimes acquired. If the first are almost always situated upon the median line, it is generally because the cavity of the vault of the palate has not filled up posteriorly, and that its two halves are not united at that part at the usual period. They are, however, sometimes found a little to one side, but they have never yet been seen double. The second, (or acquired,) which are ordinarily the result of traumatic lesions, and more especially of syphilitic ulcerations, are encountered to the right and to the left as well as in the middle, and under the form of notches, the depth of which is usually limited by the border of the vault of the palate, while the congenital extend often to the dental arcade, and to such degree as to be continuous with the simple or double harelip should the patient be simultaneously affected with that.

A. *History.*—Nothing in the ancients indicates that they ever undertook to cure this malorganization. Roland, Harnemann, and Ténon, who have mentioned and seen it, do not speak of its treatment. The moderns, more enterprising or more skilful, have endeavored to fill up this void, and their efforts have been crowned with the most fortunate results. In casting the eye upon a fissure of the uvula, the idea of staphyloraphy must have frequently presented itself to the mind. The trials which M. Colombe states that he made of it in the year 1813 on the dead body, and which he wished to repeat in 1815 on a patient who refused to submit to it, have not been known to the public. That of which M. Graefe published the details in the Journal of Hufeland for 1817, and which he dates at the end of 1816, not having succeeded, has also passed unnoticed. It is therefore to M. Roux for whom it was reserved to call attention to this subject. In 1819 a young physician, M. Stephenson, presented to him the first opportunity for this operation. It succeeded to his wishes, and M. Stephenson himself made known his cure in a thesis, supported at London in 1821. In 1822, the following year, M. Alcock was no less fortunate than the surgeon of Paris. It was then that the rights of M. Graefe to priority were appealed to by his countrymen. There is every reason, however, to believe that staphyloraphy had been practised in former times. Robert, in fact, says in his memoirs on various medical subjects, published in 1761: “A child had the palate *cleft* from the velum to the incisor teeth. M. Lemonnier, a very skilful dentist, endeavored and succeeded in *reuniting the two borders of the cleft*, first inserted *several points of suture* in order to keep them approximated, and afterwards *abraded* them with a cutting instrument. An inflammation supervened, which terminated in suppuration, and was followed by the reunion of the two lips of the artificial wound. The child was perfectly cured.”

The words: child, a cleft, suture, the abrasion, the approximation, and the cure,—all this, notwithstanding the somewhat obscure language of Robert, scarcely permits us to doubt that his dentist must have in reality had recourse to staphyloraphy, and not to the suture of a simple perforation of the vault of the palate. This operation therefore is, in every point of view, a discovery entirely French. It is one, moreover, which is so frequently required, that up to the present time, 1839, M. Roux has himself performed it nearly one hundred times. M. Jousselin of Liege has obtained two cures and M. Baubien a third. M. Caillot of Strasbourg has published a fourth, and in 1828 M. J. Cloquet a fifth. M. Morisseau has published a sixth, obtained by him at Sable, in a young girl aged twenty years. Bonfils communicated another about the same time to the Society of Practical Medicine at Paris. MM. Smith, Hosack, Stevens and Warren, in America, M. Dieffenbach and others in Germany, and MM. Philippart, A. Bérard, (*Arch. Gén. de Med.*, 2e sér., t. IV., p. 629,) A. Thierry and Baraduc, (private communication,) in France, have had every reason to be satisfied with it. I have myself been no less fortunate in one instance. M. Roux performs it at the present time in the same manner that he did in 1819. In Germany, in place of the word *uranoraphy*, which M. Graefe proposed, others have wished to substitute the terms *velosynthesis*, *kyonoraphy*, *uraniskoraphy*, &c. MM. Doniges, Ebel, Hruby, Dieffenbach, Wernecke, Lesenberg, Schwerdt and Krimer, have all endeavored to simplify the instrumental part of it; and in England M. Alcock himself no longer follows the method of M. Roux in all its particulars. All the stages of the operation have been discussed, and deserve to be so.

I. *Abrasio* *of the Cleft*.—*Cauterization* by means of muriatic and sulphuric acid, or caustic potash, as attempted by M. Graefe, or with the tincture cantharides, lapis infernalis, and even the hot iron, as proposed by MM. Ebel, Wernecke and Doniges, answer a no better purpose for *abrading* the fissure of the velum palati than that of the lips. *Excision* is indispensable in both cases. M. Roux, by means of the *dressing forceps*, somewhat concave and slender, successively seizes the two halves of the uvula or of its division near their free extremity, taking care to include only a very small portion of their border; then detaches from them, by proceeding from below upwards or from behind forwards, a strip of tissue a line thick, which he prolongs as far as their angle of reunion, and even a little beyond, if the bony vault remain intact. For that purpose a *straight blunt-pointed and very narrow bistoury*, moved in the manner of a small saw, appears to him preferable to the scissors, which are bent into an angle upon their handle near their heel, and which he at first proposed, and which he even still sometimes uses to commence this excision. In the beginning M. Graefe, in order to carry out the indication in question, made use of, first, a *long forceps*, curved back laterally near their points and terminating in a double erigine; second, of an *uranotome*, which is too complicated for me to attempt to describe here. Dr. Hruby has found that curved scissors, like those of Museux, terminated in the form of crutches, firmly secure the velum during the time of the excision. The forceps of M. Graefe, with or without hooks, have appeared sufficient to M. Dief-

fenbach, who, for the abrasion properly so called, has contrived a small knife, a good idea of which would be conveyed by a lancet which was narrow at its heel and mounted upon a long handle. Finally, M. Schwerdt differs only from the preceding authors in not having his forceps bifurcated at their extremity.

II. *Approximation.*—The interrupted suture, the only one which in these cases can enable us to keep the two abraded edges in contact, are nevertheless applied in different ways.

a. *The needles* of M. Roux, which are short, flat and curved, in the manner of a hook, are nevertheless broad at their heel, upon which as in all other needles is placed a large square eye. The *ligature* which he threads them with is composed of four or five strands, properly waxed and about two feet long. His *needle-holder*, already known in the arts, is a sort of forceps having a groove on the inner side of its branches, and which are tightened or relaxed at pleasure by means of a ring.

b. Those which M. Graefe made trial of in 1816, represent very nearly the half of an ellipse. They are of less breadth but greater length than those of M. Roux, but their eye is much more elongated and perforates them at the side, as in the ancient suture needles. The forceps designed for inserting them is not traversed by any stem. Two rings, which are two inches apart, and which support two lateral uprights, open or shut it by gliding towards its extremity or its handle. At the present time the needles of M. Graefe are almost straight and terminated in a spear point. He has, moreover, bent his former needle-holder into an angle near its point, in order that when the needles are fixed by their border into the root which the branches of this instrument present, they may transform it into a legitimate hook. Finally, M. Graefe has dispensed with the rings of this needle-holder, which at the present day consists only of a jointed forceps, the movable branch of which is vibrating as in the concealed lithotome.

c. The needles of Ebel, which are straight, sharp pointed, and broader in the middle than at the heel, have, like those of M. Roux, a square opening to receive the thread. Those of M. Alcock are curved into an elongated circle, and are almost round. M. Dieffenbach has devised some which resemble a small punch. They have no eye, are straight or slightly concave, hollow in their posterior half, and may receive a leaden wire, which their inventor prefers to any other substance, and which they readily draw after them. His needle-holder, still more simple than that of M. Graefe, is in fact nothing more than a ring forceps, whose branches, which are a fourth part only of the length of the handles, are bent almost into a right angle in front near their point.

d. The needle and needle-holder of M. Doniges, make but one instrument. It consists of a long stem supported upon a handle of ebony, slightly bent posteriorly, and terminated in front by a needle hook pierced near its point and hollowed on its convexity to receive the thread. That of M. Lesenberg differs from it only in this, that it is formed of two parallel branches, which are separated or approximated by the same mechanism as the first needle-holder of M. Graefe; in such manner that all that is required is to open it after it has perforated the parts, in order that the thread that it has conducted may

be free, and that we may withdraw the needle without acting upon the ligature. M. Schwerdt, in adopting this needle, has proposed that we should attach to it the bascule branch of the last needle-holder of M. Graefe, in order to curtail it of the shifting rings of M. Doniges.

e. *M. de Villemur* has contrived some which are altogether different. His, while being retained in the needle-holder, are straight. Issuing from their sheath, from which a central stem enables us to expel them, they assume the curvature of the needles of M. Roux. As we push them from before backwards, they fall naturally into the pharynx, from whence they are to be withdrawn gradually by means of a dressing forceps. The two ends of each thread being brought forward and knotted out of the mouth, transform the ligature into a great circle, the noose of which it suffices to draw by its side, to make its broad portion slide backwards into the pharynx, after which we untie the knot and terminate as in the other methods.

III. *To knot the threads.*—The ligatures being once adjusted, every thing is not yet finished ; they are also to be knotted and fastened. In France it would be difficult to comprehend why for this part of the operation it would be necessary, as M. Graefe recommends, to add other instruments to those already mentioned : 1st, a small hollow cylinder, pierced upon its sides ; 2nd, a forceps bent into an angle on its back near its handle, and hollowed out with two grooves on the outer surface and each side of its point ; 3d, a screw, or species of stopper, modelled after the preceding ring ; 4th, a second forceps, straight, and with a handle like the ordinary caustic-holder for the lapis infernalis ; and 5th, a long steel stem, mounted upon a handle, dilated and cut into a square shape at its free extremity, where are situated two openings to receive the two halves of the ligature and to form in itself a legitimate knot-tightener. This display of useless objects is sufficient of itself to make known their inconveniences, without the necessity of my particularizing them. M. Doniges in proposing the surgeon's knot as a substitute for the instruments of M. Graefe, a sort of crutch, cleft at the two ends of its transverse piece to receive the two ends of the thread which are to be drawn with one hand, while with the other we push this instrument towards the suture, has doubtless forgotten that the fingers would attain this object infinitely better. Nor can I see what advantage in reality M. Krimmer can find in the employment of gold screws, rather than those of iron, like those of M. Graefe, of black threads rather than white, and those that are oiled in preference to those that are waxed. The method of M. Roux is still more simple and more natural. This surgeon, after having seized and passed the two ends of each ligature one into the other, makes a simple knot, which the forefingers directed to the bottom of the mouth, enable him to tighten as powerfully as he wishes. An assistant immediately embraces this knot with a ring forceps, and holds it firmly, in order that it may not be relaxed, while the operator is occupied with fastening it definitively by means of a second knot formed in the same manner, and outside of which we are afterwards to divide by a cut of the scissors, each of the superfluous portions of the threads of the ligature.

B. *Operative Process.*—Staphyloraphy, properly speaking, is not either a difficult or a painful operation ; but being long, delicate, and fatiguing,

it requires much endurance on the part of the patient, and even on that of the operator. Consequently it cannot be performed except upon those who desire it, who are fully sensible of its importance, and who have made up their minds to submit to it. It rarely happens, therefore, that it is attempted in children under the age of from 12 to 15 years. It exacts no precautions of regimen; only that the individuals should in other respects be healthy. Diseases of the gastro-pulmonary passages would especially compromise its success, from the cough, sneezing, and necessity of spitting, which so frequently accompany them.

I. The different instruments, and which are to be prepared beforehand, are composed of: 1st, six flattened regular and pliant ligatures; 2nd, twelve needles, one threaded at each end of the ligatures; 3d, an ordinary needle-holder, or that of M. Dieffenbach, if the needles of M. Ebel, which are almost straight, should be preferred; 4th, a good pair of dressing forceps, the branches of which being a little concave, should not touch each other exactly when they are shut, except at their point, or better still, the claw forceps; 5th, a straight, blunt-pointed bistoury, narrower than that which is generally carried in the surgeon's case, or a very sharp-pointed and very narrow straight bistoury; 6th, excision scissors, and straight scissors, for dividing the ligatures; 7th, corks hollowed out into a gutter at each extremity, to accommodate themselves to the form of the dental arcades; 8th, a spoon intended for depressing the tongue in case of necessity; 9th, a number of towels, an aleze, cold water, a glass, basin, and also a small quantity of vinegar.

II. *Situation.*—The patient, provided with an aleze, and wrapped in a napkin and seated with his head supported by an assistant, should be placed in a powerful light, as for the excision of the tonsils. A second assistant stands ready to hand, as may be required, the basin and the water as well as the instruments.

a. *First stage.*—The operator being placed in front and on a chair, properly elevated, first introduces the corks between the molar arcades on either side; then seizes the right border of the division, by means of a forceps, in his left hand; directs the needle-holder, which has been threaded, into the pharynx with his right hand; brings it forwards and endeavors to make its point fall at three or four lines outside of and near the lower part of the fissure, in order that it may perforate the velum. Seizing hold of this needle by its point with the forceps transversely, after it has penetrated as far as possible into the mouth, he detaches its heel at the moment when the assistant opens the needle-holder, and without exercising the least movement upon it; he then removes this last instrument, takes the forceps in his right hand, draws the needle entirely towards him and brings it out of the mouth, while it fetches the ligature after it. The patient being fatigued, is under the necessity of spitting and of reposing for an instant. The jaws are then freed of the corks by which they were held apart, before proceeding to do on the left side with the second needle and the other end of the thread, by changing hands, what has already been done on the right. In order that they may not be confounded with those which are to follow, it is advisable to knot the free extremities of this first ligature and to depress its noose a little

into the bottom of the throat, in order that it may not interfere with the application of the others. The two extremities of it are drawn towards the commissures, and brought up by the assistant on the sides of the head. The surgeon then places the second and afterwards the third ligature, if he deems it necessary, with the same precautions and in the same manner, leaving between them nearly the same interval.

*b. Second stage.*—After having depressed, to one or two inches, the noose of each thread while pushing them backward, in order not to run the risk of dividing them with the bistoury or angular scissors (*ciseaux coudés*), the operator embraces the left lip of the cleft at the end of the uvula; commences with the scissors the excision of the thin strip which he intends to remove, and which the forceps is not to let go of, while he continues to separate it with the bistoury as high up as the bony vault; performs the same manœuvre on the right lip with the left hand, and returns to the use of the scissors, in order to regularize this abrasion, if the bistoury has not been made to act in a uniform manner on all the points of the abnormal division. The blood flows out, obstructs the pharynx and very frequently collects in clots about the threads. The patient requires to be relieved from it, and to gargle and to remain tranquil for some moments. In other respects the most difficult part of the operation is now completed.

*c. Third stage.*—*The ligatures are to be now identified* and to be arranged in order, that they may be readily found again, and then successively knotted, commencing with that below. When the separation is considerable, and its coaptation appears to be attended with difficulty, M. Roux detaches each of its lips from the posterior border of the palatine bone by a transverse incision of from four to six lines in depth. The two halves of the velum being then no longer restrained by the hard parts, yield and approach each other with an astonishing facility. It is the mode of preventing all dangerous traction on the part of the threads, and the new wound which has been made, afterwards spontaneously closes without necessarily giving us any uneasiness. In order to remedy the same inconvenience, M. Dieffenbach finds that a longitudinal incision at four lines external to and on each side of the abnormal fissure, is infinitely preferable to that of M. Roux, as it possesses all its advantages without having any of its inconveniences; that it also heals up of itself, and without interfering with the relations of the palatine vault, admits of a very decided elongation throughout their whole extent, of the flaps that we wish to bring together. These two modifications are not unimportant, and should be adopted; the first when a separation of the bones is complicated with a fissure of the soft parts; the second, which is more common, when we have only to overcome the resistance of these last, and the retraction of the muscles of the palate.

*C. Subsequent Treatment.*—After the ligatures are once knotted the operation is finished; no dressing is required; the patient is to remain quiet, without speaking, and be careful not to laugh, cough, vomit, spit or sneeze, and to take only broths or light soups, until the suture has acquired some degree of solidity. On the fourth day the first thread, that is, the middle one, may be removed; the second or

highest on the day after, and the third not until the sixth day. It is to be understood that they are to be left one or two days longer should the agglutination not appear to have been completed at the ordinary period. It need not be remarked also that, in order to relieve the tissues of them, we are to confine ourselves to dividing them upon the side of the knot, which is to be held and then withdrawn with the forceps. Nevertheless the operation quite frequently fails. A young girl, whom I saw at the Hotel Dieu, was operated upon for it five times without success. Many patients of M. Roux have succumbed in consequence of it, and I have seen a certain number that this surgeon had operated upon without any benefit. Other practitioners have procured a still smaller amount of successful results than M. Roux, so that it is not prudent to undertake it except under favorable circumstances, and in patients, for example, who are in good health, tractable and between fifteen and fifty years of age.

D. *Modifications.*—If reunion has been accomplished only towards the uvula, as frequently happens when the fissure is prolonged upon the median line of the jaw, it should not be the source of any anxiety. Quite frequently the opening which results from it disappears without any other treatment, after the expiration of a greater or less length of time, which result moreover is to be promoted by inflaming the edges with the lapis infernalis, as I have done and seen M. Roux do, or with the nitrate of mercury, as has been successfully done by M. J. Cloquet. After all, the patient would be rid of his trouble with an aperture only, if there were not other resources, and if *palato-plasty* was not at our command for an accident of this kind.

I. *Cauterization.*—There is another method yet, which is repeated cauterization at the superior angle of the fissure, either by a small bird-beaked cautery, or the nitrate of silver, as proposed by M. Henry de Lisieux, which method has been successfully employed by M. J. Cloquet, in order to entirely dispense with, or as a substitute for, staphyloraphy.

II. *Modifications.—Process of the Author.*—In place of beginning by adjusting the threads, I commence with rawing the borders of the fissure; for that purpose I seize its left free border either with the claw forceps or that which I have pointed out as the one to be preferred, in speaking of the excision of the uvula, in order to cut off a strip from it and afterwards to operate in the same manner on the other side. As the small knife of M. Dieffenbach might, if necessary, be replaced by a keratotome or by a lancet of some length, secured by being wrapped in a strip of plaster, or even by a common straight bistoury, and which has no other inconvenience than that of incurring the risk of wounding the posterior wall of the pharynx, I should not hesitate to make use of it in place of the blunt-pointed bistoury; but a straight, very sharp, and very narrow bistoury is much better still. Being plunged through the velum palati from the mouth towards the pharynx, and very near the fissure which is to be excised, and afterwards conducted parallel to this fissure, at first in front or towards the bones or from below upwards, then towards the uvula, a strip is readily separated from it, the extremities of which, being the last that

are detached, evidently render the excision of the whole more certain and more easy by furnishing a double support to the instrument up to the end of the operation. I now wait a few minutes, and, as soon as the blood no longer flows, I adjust the ligatures with the flexible needles and needle-holder of M. Villemur,—that is to say, from the mouth towards the pharynx, or from before backwards, as is preferred by M. Bérard, (*Arch. Gén. de Méd.*, 2e série, t. IV., p. 629.) The rest of the operation requires no particular directions: I succeeded in this manner, in 1837, in a young man at the hospital of La Charité. M. A. Berard was no less fortunate in another case. But in a young girl whom I operated upon in the same manner in February, 1839, the reunion did not continue.

III. An instrument furnished with straight needles, carried from before backwards, and which secures the velum by embracing it, and brings back the needles and the thread at the same time through the fissure, would simplify every step of the operation, and has lately been made, at my request, by MM. Chopinière and Foratier, pupils of the hospitals. M. Beaumont, (*Med.-Chir. Review*, Oct., 1838, p. 148; *Enc. des Sc. Med.*, 1838, p. 119,) with the view of more readily applying the suture to vesico-vaginal and recto-vaginal fistulas, also makes use of a sort of needle-forceps, which enables him to introduce and draw the thread through the staphyloraphy in one movement.

IV. In a boy eleven years of age, in whom a fissure was made in the palate by a piece of wood, *M. Fristo* succeeded completely by making use of a blunt-pointed bistoury to excise the parts, and of a long dissecting forceps, provided with a sheath, for a needle-holder. A small hook, mounted upon a leaden handle, answered the purpose with M. Philipart; and M. Smith, rejecting the complicated apparatus of M. Hosack, finds nothing more required to introduce all his threads than a hook-shaped lance, (*lance à crochet*.)

V. M. Montain's clasp is too fatiguing to be generally adopted. Finally, if the fissure should continue near the incisor teeth we might, as M. Sanson (Diday, *Thèse de Concours*, 1839, p. 25) did in one instance with success, shut it up by means of a flap borrowed from the upper lip.

[*Staphyloraphy*.—From a recent elaborate work of the celebrated Dieffenbach, (*Die Operative Chirurgie*, Leipzig, 1845—see also condensed abrégé of this work in the *Dublin Journal of Medical Science*, Nov., 1845, No. LXXXIII., vol. XXVIII., p. 227—249,) it would appear that this surgeon now dispenses with the usual preparative process of familiarizing the parts to the touch of the instruments, fingers, &c., before proceeding to the operation, from having himself found it impracticable, and also from patients being so averse to it. He however approves of it where it is practicable, illustrating its effects by the fact, that those who suffer from chronic ulcers in the throat, lose altogether the sensibility of these parts by frequent gargling and pencilling. He uses short curved needles, the blunt extremities of which are formed into hollow tubes for holding the pointed ends of the leaden wires used for the sutures. The lead wire should be of new drawn lead, as the old is brittle. The clots of blood are removed by a small piece of globular sponge, fixed in a

delicate forceps. The patient may take water in the mouth after the margins are excised, but not gargle, as this excoriates the abraded parts. When the cleft is not wide, and after the clots of blood have been thoroughly removed, the lead stitches, the upper one of which is to be inserted first, are to be twisted close together, so as to bring the edges of the excised cleft into perfect and intimate contact, so much so that the lead rings (i. e. sutures) become covered with the mucous membrane. But all this is not to be done until the whole number of sutures have been inserted, and which are only to be gradually approximated at first. Prof. Dieffenbach makes his excisions with the hook and bistoury. The *side incisions through the velum*, (and which we should say, ought to be made after excising the edges of the fissure, and inserting the sutures loose,) he deems of vast importance. One is made on each side the cleft, plunging the bistoury in half an inch distant from it, and half an inch distant also from either end of this cleft. The bistoury, with a sawing motion, is then carried directly upwards to the bony palate. Considerable blood flows, and the mouth must be washed frequently with cold water. The good effect of these incisions is seen immediately, the still-strained palate hangs down lax, like a damp curtain, and the wounds on the sides appear like two oval clefts, which would admit two fingers. The painful and straining sensation, which penetrates into the ears, also ceases imminently, and the air passes freely in and out through them. They are especially necessary and before finally tightening the wires and closing the cleft, when the fissure is wide and ascends high up; in such cases the lateral incisions have to be made through the palate, as near the cheek as possible. The patient must remain in bed, rather in a sitting than in a recumbent posture, and the mucus which collects in large quantities about the stitches, is to be frequently cleansed off by the sponge, as mentioned for removing the blood. Only water and mucilaginous drinks are to be given, as lemonade and acids oxidize the wire. On the third day the mouth may be washed with tepid water or elder tea, and on the fourth, the agglutination being ascertained to be complete, by probing it with the camel's-hair pencil, the first ligature may be removed, and on the fifth and sixth days the others. Frequently, in fact in many cases, M. Dieffenbach has thus succeeded in uniting the entire cleft. The shorter the cleft, the narrower it is, and in these, two or three stitches only will answer. If the stitches cut through and the cleft opens, they are to be speedily removed. Sometimes they suppurate, leaving only one. In that case they must also be removed without delay, except that one which is left for the support of a bridge. At the next operation, the edges being by this bridge found more approximated, will require an abrasion of a straw's width only. The preservation of union in the lower half is still more fortunate. If all the stitches cut through, the next operation should be deferred at least a year, as the scars will not have become soft till then. Frequently, M. Dieffenbach has succeeded completely in his subsequent operations. In a young lady, he met with entire success, though other surgeons had failed antecedently in three different attempts. The side incisions close without any aid from art. If after their closure any granulations protrude, they are to be touched with nitrate of silver. The closing up a cleft in the *hard or*

*bony palate* by the distinguished professor's method, is probably more easily described than accomplished. He first punches a hole through each edge of the cleft, and inserts a thick soft silver wire, which is to be drawn upon and twisted as close as it can be, after having first cut down upon, and then separated or cut through the palate bones on each side where they join the alveolar processes, by means of a thin, smooth, concave chisel. The flesh wound thus left soon cicatrizes, and an advantage is gained as to approximation of the cleft, by exciting its edges with the hot iron or tincture of cantharides, so as to produce suppuration and granulations upon them.

After the bony cleft is sufficiently closed, the cleft in the soft parts is to be sutured, and the side slits are to be made as before. The rest of the operation consists in covering over the bony cleft with mucous flaps, detached from each side, and drawn over and pressed into the cleft, and united at their free borders with fine leaden sutures. The abraded surface left by these flaps fills up with granulations, which prevent the mucous operculum from retracting again entirely, should some of its stitches cut through. It sometimes becomes necessary to cut entirely through a sound soft palate, in order to reach and extirpate or to cauterize steatomatous tumors, adherent to the posterior portion and to each side. This cleft is to be left open for free respiration till the cure is effected, and then reunited in the manner already described.

*Small openings* that remain in the palate after it has been stitched, or which come from ulcers, are found to be more effectually closed by *concentrated tincture of cantharides*, than by nitrate of silver, which latter Professor Dieffenbach says causes the loss of a layer of the organized mass, while the process of granulation which follows, produces an insufficient deposit of fibrine, so that the hole generally, actually increases in size. This, if accurately true, is a most important point to be remembered in all such apertures, since it is well known that they have hitherto been almost exclusively treated by cauterizations with the lapis infernalis. If these apertures are large and *oval*, their edges are to be regularly excised and brought together by a sufficient number of lead wire sutures. If we endeavor to cut *round* apertures into *oval* ones, there is risk, as the opening becomes larger if we fail. Their edges should be abraded however, and one or two stitches inserted, which are to be tightened after making a crescentiform incision through the palate on one side only of the hole, or if the hole is of considerable size, we should make one of these incisions on each side of it. The lateral incisions are to be stuffed with lint, which causes them to keep open, after which they gradually fill up with granulations. Small holes in the hard palate may also be healed up by excising their edges, also by means of tents of lint saturated with *concentrated tincture of cantharides*, kept in for an hour at a time and prevented from being swallowed by a strong thread attached to the tent and fastened outside the mouth. For large openings the professor recommends an artificial palate to *cover* the same, but not to project into it, and which instrument should itself be covered on its outside with a thin layer of gum elastic, and fastened by means of flat wire-beams to the cheek teeth. This does not prevent attempts at a radical cure by taking out the

palate daily, and moistening the borders of the instrument with the tincture of cantharides. In this manner he has frequently seen apertures that a finger could enter, finally closed up.

In all his operations on cleft palate, he gives the preference to lead wire sutures, because they can all be gradually tightened to the same degree so as to make uniform traction; whereas waxed silk and thread ligatures cannot be tightened uniformly, and some of the sutures will draw more than others and some even cut through. The hook and bistoury in making the excisions is far less irritating to the palate, and more commodious, he says, than the scissors. He says the suture is much more difficult, if we adopt M. Roux's mode and adjust that *before* making the side incisions. The side incisions also, even if we do not succeed, give us a better chance for success afterwards, for nature compels them to close up with new granulations, which of course in the same proportion diminishes the width of the cleft. M. Dieffenbach strongly condemns the cylinders used by Villemur's method to introduce the needles.

The wearing of any kind of obturator, that goes *entirely through* the aperture or the bony palate, as for example sponge or metallic substances, must necessarily defeat its own object in a measure, by enlarging the aperture itself. M. Dieffenbach has thus seen an aperture of the size of a quill increased so much as to admit the finger. There is no apparatus for clefts or holes in the soft palate, nor *imitation* velums and uvulas which can be employed without danger. In small apertures of the velum with callous edges, we may, until we operate, allow the patient to wear a double elastic plate, which represents a kind of caoutchouc *stud*, until it is practicable to operate. This is the invention of M. Dieffenbach. The intermediate portion must be so small in diameter as not to touch the edges. [Quere. Why could not this ingenious contrivance of M. Dieffenbach be used also for large apertures and wide fissures in the hard palate, and thus avoid the danger of increasing their diameter? T.]

In applying it the patient stands before a glass, and pinching the inner plate with a forceps inserts it through the hole, when it is immediately adjusted by its own elasticity. It is to be removed three or four times a week in order to cleanse it, and also to touch the edges of the opening with the tincture of cantharides should there be a prospect of diminishing the aperture by this means.

In *children*, where the cleft goes through the entire roof of the mouth, an apparatus made of a steel keel which goes over the head and has circular plates attached, which constantly press on both cheeks at once, will, if worn for some time, sensibly diminish the fissure by the compression it makes on the jaws.

In conclusion, to restore a destroyed velum is next to impossible; but in partial destruction of one side only we may make trial of the lateral incisions, excisions, and sutures, as above described. When through scrofulous ulcers or other affections, the *posterior surface of the velum has become agglutinated to the pharynx*, thus completely cutting off and isolating the nares from the throat, closing up the eustachian tube and causing deafness, it becomes exceedingly difficult to separate the parts. This is to be done by a cross incision, and

then detaching the soft parts from the posterior pharynx, and aiding this operation by a suitable spatula passed through the nose.

Mr. Fergusson of London, (see *British and Foreign Medical Review*, April, 1845, No. XXXVIII., pp. 415, 416,) by dissection of the cleft of the soft palate, and a careful inspection of its movements during life, comes to these conclusions: 1, that the flaps are slightly drawn upwards and to the sides, when the levator palati contracts; 2, that when the levator palati and palato-pharyngeus act strongly and together, the flaps are so forcibly drawn from the mesial gap, that they can scarcely be distinguished from the sides of the pharynx; 3, that the flaps are forced together, and the edges come into contact when the superior constrictor muscle contracts during the act of deglutition; 4, that the circumflex palati possesses but a feeble power over the flaps; and 5, that the fibres of the palato-glossus were very imperfectly developed in the specimen in his possession.

Based upon these principles, he proposes a *new process*, which he has in two instances applied with entire success. This consists of the division of those muscles of the palate, which have the effect of drawing the flaps from each other, and widening the gap between them when they contract, so that the stretched velum may be in a state of repose, and the joined edges may not be pulled asunder by any convulsive action of the parts during the process of union. That is, as an accessory to the operation, he advises a division of the *levator palati* and *palato-pharyngeus* muscles, and if requisite the *palato-glossus*. This is intended to effect *methodically*, by the application of *myotomy* to staphyloraphy, what probably is more thoroughly attained by M. Dieffenbach's large side-incisions through the velum.

Our countryman, Dr. Mütter, states that by the mode in which he has proceeded for staphyloraphy, he has succeeded in giving relief to all but two cases out of the twenty-nine he has operated upon. (*Report on the Operations for Fissure of the Palatine Vault*. By T. D. Mütter, M.D. 1843.) Dr. Mütter, like Dr. Mott, has found great advantage in the preparative familiarization of the parts to the instrument, finger, &c. So decided was this effect in one case, that Dr. Mütter could dispense with all means for keeping the jaws open or the tongue in place. He uses the hook, and seizes the lowest angle of one edge of the cleft first; then plunges a thin, narrow-bladed knife into this part, and like Dieffenbach, excises rapidly upwards to the bone. The strip is then drawn tense and detached downwards. His needle is small and curved, and fixed in Physick's forceps, and the thread is waxed silk. Unlike Dieffenbach, Dr. Mütter puts the lowest suture in first. We have noted the principal points in which the steps of Dr. Mütter's process differs from that of others. He has never met with any serious accidents. If *severe griping* should follow the operation, and which symptom he attributes to the swallowing of blood, he recommends as the best resource, injections to be repeated every hour till the blood is brought away, or if requisite an anodyne enema.

Sir Philip Crampton's process differs from most others in two peculiarities, (*Dublin Journal of Med. Science*, vol. XXII., 1843, p. 320, &c.): 1, in securing the ligatures, which are of the ordinary

kind, by passing down upon them, as suggested by Mr. Maclean of Dublin, a small metallic bead, which, when it reaches the edges of the cleft and has drawn them together to the degree required, is compressed by a forceps, and thus makes a knot unnecessary ; 2, in discarding the starvation system of some, and allowing the patient to eat all kinds of lubricating soft food, as jellies, custards, soups, &c. He had at the period mentioned performed the operation by his process in two cases, one a boy aged 12, and also on a young lady aged 16, in both with entire success.

At the sitting of the Paris Royal Academy of Sciences, March 17, 1845, (see *Arch. Gén. de Méd.*, 4e ser., t. VII., April, 1845, p. 507,) the commission, composed of MM. Pariset, Roux and Velpeau, reported in the most favorable terms of a new *artificial substitute* for perforations through the vault of the palate, lately invented by M. Stevens. This obturator is remarkable for its nice adaptation to the parts, without the aid of springs, clasps or hooks ; also for its lightness, delicacy and strength, and the ease with which it may be adjusted or removed. In the case to which it was applied, a superior officer of the army in Africa, there was a large opening from the nasal fossæ into the buccal cavity, causing all the usual annoyances as to deglutition, articulation, &c., all of which were perfectly removed by the apparatus. T.]

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## CHAPTER IV.

### THE OLFACTORY APPARATUS.

#### ARTICLE I.—NASAL FOSSE.

##### § I.—*Foreign Bodies.*

A. Foreign bodies of all kinds are found in the nares. Khern (*Planque, Bibl. Méd.*, t. XXI., p. 568,) saw there a *calculus* of the size of a pea, and which was ejected by sneezing, after the continuance, for a year and a half, of pains between the two eyes. In another case (*Gaz. Salut.*, 1768, No. IV., p. 3,) the concretion was almost as large as a nut. M. Graefe speaks of a calculus that had formed upon a cherry as its nucleus ; also of another in a gouty person, which was friable. A nasal calculus mentioned by Wepfer (*Jourdain, Mal. de la Bouche*, t. I., p. 519, obs. 19,) and which was an inch long, rested upon the root of the only tooth which the patient had remaining. It is to be remarked, also, that stones have in this manner been very frequently ejected from the nose. A girl ejected, first, seven stones of the size of a pea, some of which were of talc and others of granite ; second, four other fragments of the size of a filbert and irregular in shape ; third, another stone ; fourth, three more stones ; and fifth, three small bladders, according to the report of a curate (*Gaz. Salut.*, 1761, No. X., p. 3,) who was the dupe of this personage. Two small girls who were brought to Deschamps (*Tr. de la Taille*, t. II.,

p. 131, obs. 47) by their mother, one seven years of age and the other eight, pretended to have been throwing out stones from their nose and ears during the space of several months; some of the stones exhibited to the surgeon left him in no doubt as to the deception; one was a piece of wall plaster, the other a very small flint; the children confessed the trick.

B. A pea had assumed in the right nostril the appearance of a polypus; Renard (*Gaz. Salut.*, No. 51, 1761, p. 4,) extracted it with the tenaculum in presence of five of his confreres, who had been deceived by it. Dumoustier mentions two dry peas which had been introduced into and had become swollen in the nose during the space of two days. It became necessary to extract them in fragments, by means of a gimlet, (*Obs. et Reflex. sur quelques Corps étrang.* etc., Strasb., 1810, p. 8, obs. 3.) Meckren (*Obs. Méd. Chir.*, chap. 14,) even speaks of a polypous excrescence containing within it a fragment of wood, which a child three years of age had secretly thrust up its nose, and which had been the cause of the suppuration and excrescence. An earwig which got into the nose and occasioned there, according to Sandifort, (*Exercit. Acad.*, 1788; *Gaz. Salut.*, 1786, No. 51, p. 83,) excruciating pains, was expelled during fumigation with tepid water, and was followed by the evacuation of a fetid pus. A leech, which had been swallowed and become attached to the nasal fossæ in the druggist Lalouette, (*Rec. de Mém. de Méd.-Chir. et Pharm. Mil.*, t. X., p. 406,) kept up in this manner an epistaxis during the space of three weeks. Bleeding, astringents and topical applications had no effect; a tampon of lint, wet with eau de Ravel, succeeded no better. The blood began to flow again when it was taken away in the morning; the patient finally blew his nose and the leech was expelled. Thos. Etbrun (*Gaz. de Méd.*, p. 288, t. II., 1761,) also mentions that a leech, whose head and tail had become attached to the posterior cavities of the nose, produced an epistaxis and spitting of blood, during the space of from 18 to 20 days, which resisted every remedy and several bleedings; the inhalation of saline vapor through the nose caused the leech to drop off behind the uvula, where it was seized with the forceps.

C. A cherry nut, which had caused an obstinate pain in the head, spontaneously came out through the mouth, after having remained a long time in the nose. A similar fact is mentioned by Verduc, (*Tr. d'Oper.*, p. 229.) A young lady in this manner ejected calculi of the size and shape of dates, according to Bartholin, (*Planque, Bibl. Méd.*, t. XVIII., p. 97,) and of the dimensions and length of the finger, according to Water, (*Coll. Thèses de Haller*, t. II., p. 230.) A peasant girl had a stone in her right nostril, which shut it entirely up and occasioned an extensive tumefaction of the nose. A fetid sanguis continued to ooze out from thence during the space of 17 years; and the septum had become pushed towards the right. M. Rittmeister (*Journ. d'Huffeland*, 1817, *et Bibl. Méd.*, t. 62, No. 185, Decembr.) succeeded in extracting the stone from it by means of the forceps. It weighed two gros and a half, and was an inch in diameter.

D. M. Champion has found the best means of extracting such bodies to be the black pin with two branches, or the hair pin fastened upon a cork. I have procured the same success with an ordinary

probe, curved into a hook near its blunt point. Madame D. called on me, in great trepidation, with her child, three years of age, who had just introduced into its right nostril a flint which could not be extracted. It was a smooth stone in the form of a sugar plum, and of the size of a large almond. The small hook readily relieved the little girl of the difficulty. We may in this manner remove peas and the pits of fruit and other uniform bodies; if the substances were stems, or angular or adherent bodies, the forceps would be preferable. For living animals and insects it would be necessary to have recourse to injections of various kinds of liquids. Making the patient sneeze and blow his nose also is an auxiliary means which he is not to neglect.

[*Foreign bodies—Nostril.*—Dr. P. F. Eve of Georgia extracted from the right posterior nares, by means of his forefinger introduced into the mouth, a tailor's thimble which a little girl aged six years had got up her nose while playing with it, and where it had remained deeply impacted for two weeks, without however producing much inconvenience, (*Amer. Journ. of the Med. Sc.*, Philad., 1839, vol. XXV., p. 494.) T.]

### § II.—Hemorrhage and Tamponing.

Whether the bleeding which comes from the nose be the result of a traumatic lesion or sanguineous congestion, as soon as it yields no longer to revulsives, cold topical applications, styptics and astringents, or that its duration and abundance give room for anxiety, the surgeon should without hesitation have recourse to the tamponing of the nasal fossæ.

A. This operation, which is as simple as it is easy, is performed in the following manner: We first prepare a roll of lint sufficiently large to shut up the posterior opening of the nostril, around the middle of which is tied a double waxed-thread, and to this also a long common thread. Other rolls, which are of smaller size or merely made with coarse lint, are also to be prepared beforehand. The operator passes into the pharynx, through the bleeding nostril, either a gum elastic catheter or catgut, a leaden or silver wire, or even a stem of flexible wood, or if it is practicable *Bellocq's* sound, and proceeds in such manner as to bring to the outside, through the mouth, the extremity of one of these objects, either by seizing it at the bottom of the throat with one or both fingers, or by pushing the spring of the sound, if it is this that he employs. Then attaching the double thread to this extremity, he draws upon it in order to bring the roll of lint into the posterior fauces, carrying with it the single thread. He then removes the guiding instrument, which has now become superfluous: again draws upon the plug of lint and forcibly secures it from behind forwards in the diseased nostril, which is thus found closed up posteriorly; separates the two extremities of the ligature which come out through the nose; passes between them, from below upwards and before backwards, the other rolls or coarse lint, until the front portion of the nasal cavity is entirely filled up by them; afterwards crosses the threads as if for the purpose of knotting them, and tightens them with all the force that he judges neces-

sary upon this last mentioned tampon, in such manner as to push it backwards, at the same time that he acts again upon the other with equal force in order to bring it forwards. By this means we may easily fill up the nostril with lint, close up at least its two openings, and present an insurmountable obstacle to the hemorrhage. The two ends of the thread which come out of the mouth and nose are to be raised up and attached to the cheek, or fastened to the night-cap of the patient, until the period arrives when the dressing is to be removed. It is at this time only that the single thread is to perform its office, unless the surgeon has been forced to withdraw and to replace the posterior nasal tampon before definitively adjusting it previous to removing the whole, which should never be done before the complete cessation of the *molimen hemorrhagicum*, or seldom, at least, before the second or third day. He then divides or unties the anterior knot and withdraws through the nose, by means of the forceps, all the lint, with the exception of the first plug, which is removed from the pharynx, by the mouth, by making tractions upon the posterior thread.

B. We are indebted to *M. Martin Saint-Ange* (*Lapeyroux, Thèse*, No. 314, Paris, 1836,) for a process still more convenient than the preceding. A canula opening at one end into a small sac, and provided upon the side of its other extremity with a faucet, which may be opened or shut at pleasure, composes the entire instrument, which the author denominates a *rhinobion*. It is introduced, shut up, into the nose as far as to the pharynx. It is then opened, and air blown or water injected through the canula into the little sac; it is then shut up, and the distended sac drawn towards us from behind forwards, and the whole fastened upon a tampon of lint in front of the nostril. This instrument, which Bell and *M. Miquel-d'Amboise* (*Ibid.*) had mentioned, has also succeeded upon the patients treated by *M. Martin Solon* (*Bull. de Therap.*, t. XII., p. 20,) and the inventor.

[*Epistaxis*.—*M. Negrier* (*Arch. Gén.*, 4e sér., t. II., p. 354, 355) recommends as a curative means in nasal hemorrhages, to keep the two arms raised up above the head, while the nostrils are to be held shut. He has known two persons who were in the practice of this method, to stop a bleeding of the nose which they were liable to. The curative action is ascribed by him to the retardation which is thereby effected in the return of blood to the head. T.]

### § III.—*Polypi of the Nose.*

Polypi of the nose may be cured by exsiccation, cauterization, the seton, excision, tearing them out, and the ligature; but these different therapeutical methods are far from being always equally efficacious or deserving the same degree of confidence.

A. *Exsiccation*, for example, is evidently applicable only to mucous polypi taken at their commencement; it is even doubtful then if the results which it procures will be very satisfactory. Moreover, at the present day it is only occasionally employed, either subsequently to, or as an auxiliary to the excision or tearing out of the polypus. Notwithstanding what *Aetius*, *Alex de Tralles* and *Actuarius*, and a

multitude of ancient authors have said of the powder of *Teucrium marum*, and the apparent success which M. Mayer states he has had with it, this does not, in my opinion, appear calculated to throw any doubt upon this judgment. I would say the same of compression by means of a kind of tamponing eulogized by M. Lamauve, (*Soc. Méd. de Montpellier*, t. IV., p. 129,) after having made trial of it in one instance with success.

B. *Cauterization* is somewhat more worthy of attention, and I should not be surprised if the future should reverse the unfavorable verdict which the moderns have given on it. Hippocrates, who had already praised it, used the hot iron by preference. Arsenic, and acetate and sulphate of copper, were, according to Galen, preferred by Philoxenes, while Antipater and Masa also made use of vermillion of Sinape. Sandarach, pimento, burnt lead, the root of the ranunculus, quick-lime, and potash, lauded by Archigenes, S. Largus and P. de Bairo, have since been replaced by butter of antimony, (which Garengeot used only after he had protected the sound parts by placing a plaster between the polypus and corresponding wall of the nose,) nitrate of mercury, nitric and sulphuric acids, or the nitrate of silver. These different catheretics were applied to the disease by means of meches, tents, or rolls of lint, pieces of sheet-lead, metallic tubes, &c., in order to touch its prominent part and destroy it by degrees. Afterwards they substituted for these, injections of lime-water, solutions of alum or vitriol, astringent or styptic decoctions; finally, the whole array of desiccative medicaments; and the history of medicine shows that many radical cures of polypus have in fact been obtained in this manner.

I. *Process of Jensch*.—In 1827 M. Wagner published some remarkable cases which, if authentic, are worthy of attracting public attention. He succeeded in discovering the secret of a German empiric named *Jensch*, who had acquired in his province the reputation of readily curing the most obstinate polypi. Having gained possession of this secret nostrum, which is nothing else than a melange of sulphuric acid, butter of antimony and nitrate of silver, M. Wagner (*Bull. de Fér.*, t. XVI., p. 98,) was desirous of putting it to the test by following out exactly, moreover, the rules laid down by the charlatan. Now, according to his representation, its effects have been almost miraculous. The following is the process which he gives: A metallic stem, in the form of a long pin, and having a head of the size of a large pea, is the only instrument required. After having placed upon the head a layer of caustic of greater or less thickness, it is directed upon the projecting portion of the polypus, and this application is repeated from two to five times. The operation is daily renewed until the tumor falls or is destroyed. An injection of alum is thrown up an hour before and an hour after the cauterization. When the principal mass is detached, we confine ourselves to touching the remainder with lapis infernalis. The injection should be continued during the space of two months; and in order to restore to the sense of smell any defect that it may have sustained, we prescribe to the patient powder of *napeta* (*Teucrium verum*) in the form of tobacco. Moreover, I see no objection to making trial of this treatment, at least in timid patients, or where the polypus, being found as difficult to extract as it is to tie, is greater in its breadth than its pro-

truding part. It would not, moreover, be the first time that ignorance and gross charlatanism have suggested the idea of an advantageous medication to the art of treating diseases methodically.

II. *The actual cautery*, which naturally inspires somewhat more confidence than the potential cautery, and which, according to the Arabic physicians, it suffices to apply on the forehead to prevent the reproduction of polypi; which has been so warmly extolled by Roland of Parma, who applied it to the disease through a canula; by D. Scacchi and P. de Marchettis, who had the courage to repeat this application successively for twenty days; by Purmann, who succeeded in three instances by means of an iron wire heated to a red heat; and by Richter and Acrel, who were careful to wrap the conducting tube in wet linen, the better to protect the surrounding tissues, is nevertheless at the present day almost totally abandoned. It is only occasionally that we may still have recourse to it in rare instances, as for destroying some of the remains of the polypus which have been left after the other operations, to remedy the hemorrhage which sometimes succeeds to its extraction, or to attack organized (*vivaces*) or malignant polypi. None of these cases even absolutely demand it. In the first case, escharotics, which are less alarming to patients, are justly preferred to it. Tamponing replaces it perfectly well in the second case. In the third case, the knife, hot iron, and other applications, are almost equally dangerous. The kind of polypi, which bleeds upon the slightest touch, frequently even without being touched, and which produce a remarkable change in the features of the patient, and are accompanied with lancinating pains, do not in fact yield to any remedy, and form a true *noli me tangere*.

III. *Appreciation*.—The operation, moreover, is easy, so long as the polypus is not situated too deep within. During the space of some days the anterior orifice of the nose is to be dilated if the cautery is to penetrate through it. *A speculum nasi* afterwards enables us to ascertain precisely the situation of the tumor. After these preliminaries, the surgeon takes a canula, attached at an angle at its base to a handle, or to the ends of a species of forceps, unless he prefers making use of a simple tube secured by a dressing forceps; wraps it in wet linen, and directs it upon the polypus, which may then be burnt by means of the reed or olive-shaped cautery heated to a white heat. Through the mouth, that is to say for polypi in the posterior fauces, it would, in most cases, be impossible to use this means, which, even in other instances, is frequently followed by intense cephalalgia and very severe cerebral accidents, as Sabatier has repeatedly observed.

C. *The seton* is a resource of another kind. Three distinct objects, might, if necessary, be obtained by this.

I. *The packthread arranged with knots*, first proposed by Paul or rather by Rhazes, afterwards by Avicenna, and especially by Brunus, in order to *saw through* the polypus, is a species of seton constructed with considerable ingenuity, but which must act, to say the least of it, as much on the Schneiderian membrane as on the morbid tumor. Nor is the *silver wire*, surrounded with a brass wire running round it spirally and sustained by two handles, the one fixed and the other immovable, as recommended by Levret, in place of the seton of the ancients, found any longer in practice.

II. The idea of *Le Dran* was more natural. This surgeon, by passing a hook through the nostrils, in order to seize a meche of cotton introduced into the pharynx by the forefinger, or by inserting a catgut, which he brought to the exterior through the mouth, in order to attach this meche to it and to draw it afterwards from behind forwards into the nasal fossa, succeeded in destroying a polypus, many of the roots of which at first had escaped from him. It was then easy for him to introduce daily into the nose a roll of dry lint at first, to remove the foreign matters ; and in the second place rolls of lint saturated with digestive or catheretic ointment, calculated to favor the separation of fragments from the polypus, and to cleanse the wound. It was also for this purpose and to obtain this object that Hippocrates and Loyseau (*Observat. de Chir.*, &c., p. 67), and some others have also extolled the seton.

III. *Goulard*, with the intention of simplifying the process of Le Dran, has in reality only complicated it still more. The hook shaped like the nasal fossæ, which he prescribes instead of the catgut, and the fork, which enabled him to introduce the seton behind the velum palati, instead of using the finger, are evidently less convenient. After all, at the present day we introduce the seton through the nostrils in the same way as for tamponing its cavities. It is a method the advantages of which consist in enabling us to introduce medicated substances upon any point whatever of the nasal fossæ.

D. *Excision* appears to go back as far as to the time of Hippocrates, or at least to Celsus, who mentions a species of cutting plate (*spatha*), by which it was practised. Paul cut out the polypus by means of his *spathapolypica*, one of the extremities of which had attached to it a chisel, and tore out the rest by a *polypoxista*. Abu'l Kasem commenced by depressing the tumor by means of a hook, in order afterwards to excise it with a cutting instrument. Others, Scacchi, for example, operated with the simple bistoury, or, like Hutten, with a species of syringotome, or again after the manner of Nessi, with a curved and blunt-pointed bistoury. J. Fabricius censures these instruments and warmly extols a kind of forceps in the shape of a double cutting spoon, which M. A. Severin accuses him of having borrowed from Nicollini, without acknowledging it ; an instrument which Glandorp, V. Horne and Solingen have successively modified, and which Dionis, Percy and B. Bell have considered should not be entirely rejected from practice. Le Dran, Manne and Levret, who also under some circumstances excise polypi, employed no other instruments than the ordinary bistoury or curved scissors. M. Wathely, however, has in latter times returned to the use of the syringotome, that is to say, of a bistoury prolonged into the beak of a sound, concave on its cutting edge and enclosed in a sheath, in which it can be readily made to glide either towards its point or handle. When the polypus possesses a certain degree of solidity, and approximates very near to the exterior or to the pharynx, there is no doubt that by the process of Abu'l Kasem with a bistoury, or better still, the common scissors or those that are curved flatwise, we may succeed very frequently in removing it ; and that the cutting forceps of J. Fabricius may also attain this object in the depth of the nasal fossæ, under certain circumstances. Nevertheless excision is an uncertain method,

which almost always requires to be assisted by one of the preceding processes if we do not wish to see the disease repullulate, and one which consequently ought not to have the preference but in certain exceptional cases.

E. *The tearing out of the polypus* (*arrachement*), which has been generally substituted for excision, is a method not less ancient and in other respects very important. It is doubtless from having confounded the cutting pliers with the ordinary pliers, that the moderns have ascribed the first suggestion of it to Paré, or rather to F. ab Aquapendente. It is found distinctly mentioned in the works that Sprengel ascribes to Thessalus and to Dracon, the son of Hippocrates. There existed, even at that epoch, two modes of performing it. In one there was introduced by the nose a piece of sponge firmly tied and fastened by four threads; after which, by means of a long needle, they endeavored to conduct these threads into the posterior fauces, and to make traction above them by means of a forked instrument, and thus tear out the polypus. The other consisted in first tying the tumor with a catgut surrounded with a thread, and in extracting it afterwards through the pharynx. Paul and Rhazes also speak of this last process as one in common use.

I. Brunus recommends that we should remove the fleshy excrecence by means of a hook, and G. de Salicet had already advised the forceps. Aranzi, who had contrived a kind that are very long, found great advantage in directing the light so that it should fall into the nose through a hole in the window, or through a glass globe filled with water. Whatever may have been said in praise of hooks, by Job-a-Meckren, it is nevertheless to Dionis that we are indebted for the first circumstantial details upon the subject of employing them methodically. Since adopted by almost all practitioners, they have been modified by Sharpe, who sometimes employed such as were curved; by B. Bell, who pierced, or made an aperture through their branches, and by Richter, who for large sized polypi invented a kind whose branches could be adjusted separately, like those of the [uterine] forceps. The straight forceps are the best wherever the situation of the tumor allows of their application. By making them turn upon their axis, we act upon the polypus with a degree of force which cannot be applied with the curved forceps. These last are reserved for tumors which we wish to attack through the throat and bring out by the mouth. As to the *shifting forceps*, they possess a decided advantage, when the mass to be extracted is too voluminous for the common hooks to embrace it with facility in the depth of the nasal fossæ. Whatever, moreover, may be their dimensions or general form, it is important that their extremities should be pierced, or concave upon their inner side like a spoon, and provided with small points, called wolves' teeth, in order that they may have a firmer grip. It is also advisable to give them as much solidity as possible; otherwise we should very often incur the risk of their bending.

II. The tearing out of a polypus, moreover, after the manner of the ancients, has never been entirely laid aside. *Theden*, for example, first introduced a ligature upon the pedicle of the polypus, by means of a forceps, which formed by their union at the point a ring dentated upon its convexity, and pierced with an eye at each of its

free extremities ; after which he made use of his thread to exercise tractions upon, and to tear out the tumor. Although Vogel has used with success the forceps of Theden, M. Cooper, who, when he can, also tears out polypi by means of a ligature, has nevertheless deemed it advisable to reject their employment, and no one at the present day would venture to maintain that they are indispensable. In admitting that this kind of extraction may have, as M. Cooper alleges, the advantage of incurring less risk of hemorrhage, and of removing at the same time the entire root of the polypus, and the fibro-mucous membrane which has given origin to it, it would nevertheless possess the serious inconvenience of exacting two operations in place of one, of being applicable only to hard, pediculated polypi, and of not being susceptible of application but with difficulty in the depth of the nostrils.

III. When the tumor does not exceed the size of a nut, and that it is solid, and without a pedicle of too great a thickness, *Morand* has been indebted for some successful results to the following process :—The two forefingers are introduced into the nose, one in front, the other behind, and as far as the polypus, upon which traction is then made by pushing it alternately towards the pharynx and the face, in order that it may be finally detached and forced to come out by the passage which presents to it the least degree of resistance. This is a process, moreover, which, after the manner of *Dupuytren*, it would be advisable to combine with the employment of hooks. There can be no doubt, in fact, that by pressing with the finger through the pharyngeal opening of the nasal fossa upon the tumor, we should be able to effect its extraction with more certainty and facility by means of the forceps, which draw upon it in the opposite direction.

IV. *Operative Process.*—This mode by *arrachement* requires no preparation, unless we should think proper to imitate G. de Salicet, by gradually enlarging the anterior opening of the nares by means of a sponge, or any other dilating means. Cold water, oxycrat, one or more basins, an aleze and napkins, lint, and all the articles necessary for tamponing the nasal fossæ, an erigne, scissors, a blunt-pointed and ordinary bistoury, dressing forceps, the forceps of Museux and several pairs of polypus forceps, as they may be required, should be arranged upon a table or a broad board. It is also advisable to have several rolls of lint sprinkled with colophane, and even one or two cauteries in case of obstinate hemorrhage.

a. The patient with an aleze around him, and seated in front of a window with his head supported by an assistant, should have his hands free if he is an adult, in order that he may be enabled to use the gargle at pleasure ; or his hands should be surrounded and covered by the aleze, on the contrary, if he is a child. The operator being placed in front, and standing up, introduces his hooks through the orifice of the nose ; recognizes with this instrument the precise seat of the polypus, which he seizes as near as possible to the pedicle, while taking care also to embrace it to a very great extent ; draws it gently towards him ; seizes it a little higher up, if it elongates, with a second forceps, without abandoning the first ; then with a third, if he

is still fearful of tearing it without removing it by the root, and thus endeavors to extract it entire at the first operation.

*b.* When the tumor, from being situated too far within, or not sufficiently distensible to enable us to bring it to the exterior without having lacerated it, it is more advisable, as soon as we have seized hold of it, to turn the forceps upon itself two or three times without oscillating it, while at the same time we draw upon it until the polypus yields and is detached. During these efforts the instrument is held by means of its rings with the right hand, and near its entablure with the left, in order that we may direct its movements better, make it act in certain cases in the manner of a lever of the first kind, and to incline its spoon-shaped grip with all the force necessary, upwards, inwards, or outwards.

*c.* If the whole of the tumor is not extirpated at first, or if there are several of them, we immediately recommence, and always in the same manner, until we are certain that there is no longer any foreign body in the nasal fossa. In this respect, when we are desirous of knowing the exact condition of things, and that the eye no longer affords us any assistance, it suffices to make the patient blow out with force while we hold the sound nostril shut. So long as the air finds difficulty in passing we may be satisfied that some portions of the polypus have escaped the action of the instruments. If on the contrary nothing interrupts it, and it comes in freely to the respiratory passages with a *clear and full* (*nette et franc*) sound, it is useless to make any further researches and the operation is terminated.

*V. Appreciation.*—Mucous polypi are too soft and adapt themselves too readily to the parts which surround them, for the narrowness of the nasal opening to interfere seriously with their extraction. With hard polypi it is different; the irregularities which they are covered with in order to adapt themselves to the form of the passages, the prolongations that they sometimes send off, either backwards or forwards or into the maxillary sinus, or, as I have seen in one instance, into the zygomatic fossa through the spheno-palatine foramina, two other instances of which have also been seen, one by M. Blandin and one by M. Cazenave, (*Bull. Méd. de Bordeaux*, p. 25.) render it in certain circumstances extremely difficult to draw them to the exterior. Inasmuch as the bones in the body of the nostrils do not present any great degree of resistance to them, they depress them, push the septum in one direction, separate the turbinated and ethmoid bones in another, and very easily depress the vault of the palate; while posteriorly the pterygoid process, the body of the sphenoid and the thick border of the vomer present a much more considerable resistance to them, while in front the ascending process of the maxillary bone also presents an obstacle to them for a greater or less length of time.

*a.* They are especially arrested by the circle or fibro-cartilaginous border of the facial opening of the nostril. Owing to its great elasticity and its want of distensibility this circle has a constant tendency to return to its natural limits, and makes infinitely greater resistance than the bones to the force directed upon it. If then it should appear that the extraction of a polypus of somewhat large dimensions would

be thereby rendered too difficult, we ought, rather than have recourse to the dilatation of G. de Salicet, to slit up the ala of the nose from its free border as high as to the triangular cartilage, as Dupuytren recommends, as I myself have done in two instances, and as M. Serre (*Compt. Rend. de la Clin. de Montpellier*, 1837) has also practised with success.

b. When the tumor extends beyond the posterior opening of the nasal fossa, it is rarely practicable to extract it entire through the nose. It is under such circumstances that the curved hooks become indispensable for seizing it through the pharynx, as has been done also by M. Bermond (*Bull. Méd. du Midi ; Gaz. Méd.*, 1838, p. 442) with success. If in this position it should have acquired a great volume, or if in consequence of any particular arrangement it had crowded downwards and forwards the posterior half of the palatine vault to so great a degree as to contract the arches of the palate, the method of Maune or of Nessi, indicated by Hippocrates, Guy de Chauliac or Garengeot, adopted in practice by Loyseau, (*Obs. de Méd. et de Chir.*, p. 66,) Petit and Hulterus, (Percy, *Mém. sur les Ciseaux*, p. 70,) and which consists in *slitting open* from above downwards the *velum palati* with a curved bistoury, would not be unworthy of adoption. Heuermann and Morand had every reason to be satisfied with it; and I myself have tested its value in a similar case. The objections that Schumacher makes to it prove only that it was not indispensable in the case he mentions. It is literally a débridement which is effected without any fear of wounding an artery of any dimensions. The reunion afterwards took place spontaneously in one of the patients upon whom I operated. The polypus, which may be then embraced and torn out, if not entire, at least in fragments, by means of the forceps or fingers, might also be excised with the curved scissors or the cutting hooks of M. A. Severin.

c. Finally, there are cases where it is necessary that these different operations should be united and skilfully combined, where after having extracted a large portion of the tumor through the nose, and another through the pharynx, as is seen in the example that M. Chauvet has given, whether we have detached it or not in front or behind, enough still remains to which the process by *ébralement* of Morand might also become applicable.

d. In whatever manner it is performed, the patient should be permitted from time to time to wash out his mouth and nose by furnishing to him simple cold water or vinegar and water. Should the hemorrhage become too abundant, every manipulation should cease, and further attempts put off to an interval of some days. When however it does not cease spontaneously, it is arrested by tamponing, which renders the application of caustics or hot iron almost always unnecessary. Nor should we proceed so far as this even until we have unavailingly made use of inhalations of the eau de Rabel, or a solution of alum or some other styptic.

VI. *Torsion.*—The extraction of polypi, and especially of mucous polypi, is almost always effected by torsion. The surgeon having embraced the tumor well and properly adjusted the hook or forceps, turns it while drawing upon it as if upon its axis, and thus incurs less

risk of having the instrument relax its hold, and the polypus crushed and broken into fragments before yielding at its root.

VII. *Subsequent Treatment.*—The tearing out of polypi is rarely followed by serious accidents. It is rare that any fever supervenes, or that the patients are under the necessity of restricting themselves to diet during the space of two or three days. It is, nevertheless, a method which is far from always succeeding, or of being susceptible of employment under all circumstances without inconvenience. It is particularly well adapted to mucous and fibrous polypi, which have one root only, and to all those whose base is not extended over too large a surface, or which, in a word, it is practicable to extract entire. The sarcomatous polypi, whose cancerous degeneration commences at the projecting part, would also be applicable to it if, as Dupuytren alleges, we could distinguish them from the others before proceeding to the operation; but according to Boyer, it would in other cases only hasten the development of the accidents, and lead to dangerous transformations. Here also, more than in any other cases, the operator ought to recollect the anatomical arrangement of the nasal cavities, in order that he may not pinch up and tear out for polypi the turbinated bones which are external to it, nor shatter the septum which is on its inside, nor the cribriform plate of the ethmoid which is above, nor mistake a simple engorgement of the mucous membrane, or some deviation in the bones, for an abnormal production, nor fail at any stage of the operation in always guiding the forceps in a proper direction, nor be ignorant also that there may exist in the nose tumors, whose root is in the frontal sinuses, as in the patient operated on by M. Hoffman, or in the maxillary sinus, in the interior even of the cranium, or in the pterygo-maxillary fossa for example, as in the patient mentioned by M. del Græco, and in whom the supra-maxillary nerve was transformed into five enormous masses of a polypoid appearance. In a patient of M. Janson, (*Compt. Rend. de l'Hôtel Dieu de Lyon*, p. 64, 1822,) the polypus, which occupied the two nares and the maxillary sinus, made its appearance in the mouth through an opening in the dental arcade, partially issued through the ulcerated lachrymal sac, projected into the orbital cavity, from whence it had thrust out the globe of the eye upon the cheek, and obstructed the pharynx to such degree that it became immediately necessary to separate certain portions of it by means of the ligature and knife in order to prevent suffocation. In a boy 16 years of age in whom I had removed one lobe of it, and who died of small-pox, the polypus protruded at the same time outside of the nose, into the pharynx, into the cheek through the sinus maxillare, into the orbit and temporal fossa, and also into the cranium, the base of which had become softened and worn away by it.

F. *Ligature.*—The ligature, like most of the preceding methods, goes back to the remotest antiquity. The Greeks and Arabs, nevertheless, rarely proposed it, except as an auxiliary to excision or arrachement. We have to come down as far as to the 16th and 17th centuries before we find it clearly described and formally indicated. Fallopius applied it by means of a brass-wire, a noose of which he directed around the polypus by means of a silver canula. F. de Hilden has not described his process. Glandorp, who paid

particular attention to it, applied the ligature by means of a kind of needle shaped like a hook, and having an eye near its point, which was furnished with a silk thread. It was in the course of the last century especially, that it became the subject of a multitude of investigations and modifications.

I. *First process of Levret.*—Thus Levret proposes to conduct a silver wire by means of a sound upon the root of the tumor, to make its two extremities afterwards pass through a double canula, in order to twist them by turning it on its axis, after having fastened them to the rings which it has on its free extremity. Pallucci, in place of two tubes, soldered together at their sides in form of a double sound, states that he had invented a simple canula like that of Fallopius, but which was divided into two portions near its nasal extremity, by a small septum. Levret himself made use of this instrument, and published an account of it before Pallucci spoke of it. It is neither perceptibly more or less convenient than the preceding, of which it is to be considered as a simple modification. The same may be said of the instruments of Nesi, Hunter and Kluge.

II. *Second Process.*—Levret not being enabled to reach polypi in the posterior nares with his double canula, contrived for this purpose a species of ring-forceps or ligature-holding forceps, with long branches slightly curved, dilated at their extremity, and hollowed out, but which surgeons have not adopted any more than they have those of Theden, which undoubtedly suggested them.

III. *Process of Brasdor.*—The difficult point in the first process of Levret, is to secure the polypus in the middle of the noose, which the metallic tube conducts to it. Brasdor proposed to remedy this inconvenience by making use of a Coupelle silver wire doubled so as to form a noose, drawn in the same way that plugs of lint are from behind forward, when we wish to tampon the nasal fossæ. When the two extremities of this ligature are once brought out through the nose, the surgeon seizes them with one hand, draws them gently towards him, while with two fingers of the other hand introduced into the pharynx, he endeavors to pass its noose upon the root of the polypus, then introduces them into a knot-tightener, and immediately proceeds to the strangulation of the tumor. A simple thread is moreover fixed upon the middle portion of the silver wire, and left free in the mouth, in order to be enabled to draw the ligature backwards, and to replace it should it not be found at first to be properly adjusted. This, it must be confessed, is a real improvement; but as we cannot tighten the metallic ligatures but by twisting them upon themselves, and as they consequently frequently break before having cut through the pedicle of the tumor, many persons have always preferred to these the use of ligatures of hemp, flax or silk. The only advantage, moreover, which can be claimed for them is that they form a noose, which easily keeps itself open without bending, and which consequently is better calculated than that of soft ligatures to glide upon the root of the polypus.

IV. *Process of Desault.*—Desault, reasoning upon this hypothesis, at first confined himself to adjusting a ligature of thread in place of the silver wire used by Brasdor. Subsequently, in order to obviate the difficulty of forcing the tumor to become embraced in the noose

of a ligature so pliant, he adopted another course. His last process is performed by means of three distinct instruments: first, *a canula*, slightly curved, terminated in a dilatation, (en larme,) and having a lateral ring at its other extremity; secondly, a stem of iron or steel, which is a sort of *knot-holder*, which is shut up, and which glides without difficulty into a second canula, and when it is open represents a forceps, while when shut its beak forms a true ring; third, a *knot-tightener*, which is another metallic stem, one of the extremities of which, bent at a right angle upon its axis, has upon it a rounded opening, and the other of which forms a cleft plate. One of the extremities of the thread is attached to the ring of the canula, which it also has passed through. The other is then passed into the ring of the ligature-holding forceps, which is immediately shut up by drawing it into its sheath. The surgeon then directs these two instruments together upon the polypus, and even a little beyond it, endeavors to apply them above or below, or to the right or to the left of the pedicle of the tumor, seizes the knot-holder with the left hand and stops it at this point, while with the other hand he causes the canula to pass around the whole circumference of the polypus, and brings it to the point diametrically opposite, in order to embrace the pedicle accurately; glides once or twice, one around the other, the canula and the knot-holder, in order to transform the noose of the thread into a true circle; withdraws these instruments; leaves the ligature in its place; passes its extremities into the ring of the knot-tightener, which he pushes backwards with more or less force, with the view of strangulating the morbid mass; fastens the extremity of the ligature upon the cleft plate, and proceeds to attach it to the cap of the patient, in order to maintain the whole in the nasal fossæ. The constriction is afterwards augmented gradually by drawing each time with greater force upon the knot-tightener, and in the space of a few days the section of the polypus is completed.

V. Another process of Desault, less embarrassing than the preceding, is that which consists in introducing the noose of a long thread into the pharynx through the nostril by means of a gum elastic sound or bougie. The operator proceeds to seize hold of this noose with the finger as soon as it appears above the velum palati; brings it to the exterior through the mouth; detaches from it the guiding sound, which he withdraws through the nose; fixes to it an ordinary thread intended for the same uses as in the process of Brasdor; makes it ascend into the posterior fauces in supporting it with two fingers, while an aid draws its two extremities, which have remained free, to the anterior opening of the nose; after which they are introduced into the knot-tightener in the manner described above. If the fingers were not sufficiently long to follow the noose of the ligature as far as the posterior opening of the nares, two threads in place of one attached to this ligature, at an interval of an inch apart, and each of them afterwards passed into a canula could be advantageously substituted.

VI.—This process was still further modified by Desault himself, with the view especially of more readily applying it to polypi of the pharynx. After having brought from the mouth and throat outside of the nasal fossæ, the extremity of one ligature, and the two ends of a noose of thread of a different color, he introduced into his *canula*,

which is slightly curved, the extremity of the ligature which was left in the mouth; penetrated with this canula to the bottom of the pharynx; made use of it to pass the thread around the polypus; then caused to be passed upon it the noose of the accessory thread, which an assistant is afterwards directed to draw through the nostril, and whose object is to bring through this passage, after the manner of a hook, the second head of the ligature, which is immediately introduced as well as the first, through the ordinary knot-tightener.

VII.—*Boyer*, who approves of these different methods, and has made trial of the greater part of them with success, has nevertheless found it advantageous, under many circumstances, to substitute a catgut, to the cord of thread recommended by Desault.

VIII.—*A. Dubois*, (P. Dubois, *Thèse*, Paris, 1821,) with a view of preventing the noose of the ligature from becoming effaced before having arrived upon the root of the polypus, recommended to hold it enclosed up to that point in a piece of elastic sound, of about three inches long, which was afterwards drawn to the outside through the nose by means of tractions so applied, as if we intended to turn this ligature upon a pulley, while acting temporarily upon one of its extremities only. The sound having been removed, we draw upon the other end of the ligature, in order to bring them out upon the same line, and insert both into a knot-tightener. Unfortunately this piece of the sound does not always follow the direction we would wish to give to it. It slips and escapes, sometimes to one side, sometimes to the other, and frequently does more harm than good; so that contrivances still continue to be devised for holding the ligature open in a proper manner until it reaches to the top of the pharynx.

IX. *Process of M. Rigaud*.—In the month of January, 1829, two new instrumments were proposed for this purpose. One which its inventor, M. Rigaud, calls a *polypodome* is composed of three stems of steel susceptible of being moved, advanced, and withdrawn separately or together in a strong canula. Being curved into an arc at their extremity, they form a kind of forceps, with three branches, which are opened or shut at pleasure. Each one has a bird's-eye at its extremity; the middle portion of the ligature is passed into these openings, and its extremities are immediately brought through the nose by means of Bellocq's sound. The forceps with its three branches approximated, are then conducted into the posterior fauces. In that part they are separated to a greater or less degree, according as it becomes requisite to give to the noose more or less considerable extent. Afterwards their summit is elevated in the same manner as if we were using the polypus forceps. In order to disengage the thread, it suffices to draw with a certain degree of force upon the extremities which hang out of the nose. The two halves of their terminal cleft, being sufficiently elastic to retain the noose, which is in no way drawn upon, allow it to escape immediately upon the pedicle of the tumor. The rest of the process has nothing particular.

X. The other, which is that of M. Felix Hatin, (*Mém. sur de Nouv. Instrum., &c., et supp.*, 1830,) is a plate of polished metal curved near its pharyngeal extremity; being dilated and rounded upon its

convex surface, it may serve two purposes or fulfil two indications. In fact, its horizontal portion depresses the tongue exceedingly well, while the other obliges the ligature to glide upon it until it meets the polypus. It is an instrument of very simple construction, which its inventor uses with success, and which I myself have made trial of in two instances ; but which could, if necessary, be replaced by a tea-spoon bent forwards towards the root of its handle. The polypodome of M. Rigaud occupies less space, conceals the parts less, and is better calculated to conduct the ligature where, and as we wish, and could in fact conduct it advantageously without passing through the mouth, upon certain polypi in the anterior portion of the nasal fossæ, but it has but little solidity, and is more inconvenient than I had at first considered it.

XI. *The knot-tightener* itself has attracted the attention of a great number of practitioners. Bichat recommends that it should be jointed (*brisé*) in order that we may, if necessary, give it a greater or less degree of length, without displacing it. That of M. Graefe, which is composed of two pieces, one of which is made to slide upon the other, enables us to strangulate the polypus with force, without disturbing the extremity of the threads. But the most ingenious of all is the one which Roderick succeeded in constructing to cure himself of a polypus which had resisted all the efforts of the surgeons of Brussels. (See *Ligature en masse.*) The chaplet, which it makes, perfectly accommodates itself to the curvatures of the nasal fossæ, and fatigues them incomparably less by its presence than any other. Its balls may be made of wood, bone, or metal, and M. Sauter constructs them out of the point of the horn of ruminating animals. M. Mayor recommends that they should be made of silver, tin, &c. ; finally, in place of a winch, M. Bouchet makes use of a small barrel, while M. Levanier (*Arch. Gén. de Med.*, t. II., p. 467,) confines himself to a simple clapper (*cliquet.*) M. Braun has also deemed it necessary to modify this instrument, which had already been suggested by Girault or Riolan.

XII. *Appreciation.*—The process described by *Dionis*, and which is intended for the adjustment upon the pedicle of the tumor by means of a crow-beaked forceps of a running knot, one of the extremities of which is afterwards made to pass through the nostril by means of a long needle of lead or brass, in order to bring it out through the mouth, while the other remains at the extremity of the nose, is scarcely ever applicable. That of *Glandorp*, as modified by *Gorter*, afterwards revived by *Heister*, who, in order to adjust his ligature, successfully employed, on a woman 70 years of age, a curved needle mounted upon a handle, pierced with an eye near its point, and which is quite similar in every respect, moreover, to the needle invented by *Goulard*, in order to tie the intercostal artery, cannot however be reasonably made trial of except in those cases where the polypus has approached very near the opening of the nose. As the anterior nasal opening descends below the palatine wall of the nares, the ligature necessarily acts with force against the facial border of this wall, when we draw upon it through the nose, and tends constantly to cut into it, or at least to excoriate it. It was to remedy this defect that *Levret* proposed to add a sleeve to the two ends of the seton, which

he sometimes recommended to be used. It was for the same object that M. Félix Hatin recommended a small plate, which was to be kept vertically behind the lobule of the nose, where it was to fulfil the office of a pulley, but which plate could be perfectly well replaced by a steel stem pierced with an eye for the passage of the thread. Finally, the ligature is not adapted to polypi with a large base, nor to those that are vesicular. In whatever manner it may have been applied, it is necessary to tighten it daily up to the time of the separation of the body which it embraces. It is no longer applied at the present time as formerly, with the simple object of rendering the excision or tearing out of the polypus more easy or less dangerous, or with the intention of protecting us against hemorrhage. But it is with the professed intention of producing mortification of the polypus by intercepting the passage of the fluids through its pedicle, which result moreover it effects by ultimately cutting completely through it. Consequently we should be prepared to find that the tumor has become engorged immediately after the operation, then shrunk or decomposed, and requiring the employment of the forceps or some kind of hook when its root has been divided. - On the other hand, injections of vinegar and water, alum water, or any styptic or antiseptic solution whatever, are in such cases auxiliaries not to be neglected. Prudence also suggests that the patient should be constantly kept with his head inclined forward, in order that the putrid matters may not descend into the digestive passages. Should the polypus moreover be about to fall into the pharynx, it would be important to introduce into it beforehand a thread by means of a needle. Otherwise, it might pass towards the opening of the larynx in becoming detached, and give rise to the apprehension of suffocation. After this separation, it is well to continue still for the space of a week or two the detergent, astringent, or styptic injections, so long in fact as the nostril shall not have entirely ceased to suppurate. Having pointed out while speaking of these different methods, the merits of each one of them in particular, it would be deemed, I presume, altogether unnecessary to compare them here in their ensemble in order to appreciate their relative value. As there is no one of them which can claim the preference in an absolute manner, it must be to the judgment of the surgeon that the choice is to be left, of the process which is best adapted for employment in each case considered separately.

XIII. *Polypi of the Velum Palati*.—It may happen that vegetations, small polypi and pediculated tumors, will develop themselves upon the nasal surface of the free border of the velum palati. This is a disease of which I have seen three instances. There would be no objection to treating it by the ligature or arrachement; but excision would be evidently better adapted to it. Securing the tumor with one hand by means of an erigne or claw forceps, the surgeon excises it with the other with a strong pair of scissors or straight bistoury. The two patients whom I operated upon in this manner found themselves cured on the following day.

[*Calculi in the Nasal Fossæ.—Case of an Osseo-calculus or Bony circular Plate in the Diaphragm*.—We avail ourselves here, chiefly of a very learned and complete paper on *calculi in the nasal*

*fossæ*, by M. Demarquay, in the Archives Générales of Paris (4e ser., t. VIII., Juin, 1845, p. 174 et seq.) Though this subject has been long neglected; cases of this description of calculi have been noticed by J. M. de Gardi, (*Pratica*, Venise, 1502, post 2, cap. 14, p. 308,) Thos. Bartholin, (*Histor. Anat. Rara*, centur. 1, hist. 13, p. 47, 1654, et *Histor. cent.* 4, p. 404, *historia* 85,) Clauder, (*Ephemer. Curios.*, dec. 2, an. 13, obs. 78, an. 1685,) Kern, (*Observ.*, 46, dec. 3, an. 5 and 6; *Ephem. Cur. Nat.*, p. 100, an. 1700,) Vitus Reidlinus, (*Ephem.*, dec. 3, an. 9 and 10, obs. 145, p. 268, an. 1706,) Wepfer, (*Observ.*, 192, p. 905, an. 1727,) Ruysch, (*Obs. Anat.*, Amsterdam, obs. 44, p. 42, an. 1733,) Plater, (*De Olfactus Lesione*, lib. 1, cap. 9, p. 264, an. 1736,) Horn, (in Smuker, obs. 22, p. 289, an. 1788,) M. Savi-ales, (*Bull. de la Fac. de Méd.*, t. IV., p. 44, an. 1814,) M. Graefe, (*Annales d'Oculistique*, t. VIII., 4th and 5th liv., p. 203,) Thouret, (*Arch. Gén. de Méd.*, t. XIX., p. 27, an. 1829,) M. Brodie (*Ann. de Therap.*, *Méd. et Chir.*, No. 2, May, 1844,) and M. Blandin.

M. Graefe has properly given them the name of *rhinolites*, and the earthy and saline materials of which they are composed are readily explicable by the elementary composition of the secretions from which they are derived, viz: chiefly from those of the Schneiderian membrane, lachrymal apparatus, &c. There is no doubt, however, in our minds that earthy and saline calculous concretions may be formed in any of the cavities, passages and surfaces of the entire organism, and also in the substance of any of the tissues. Thus, at the Seamen's Retreat Hospital, New York, while the writer of this was at the head of that institution, a robust, tall, corpulent old sailor, aged 70, every way of good constitution and well formed and erect, and laboring under no other disease but an extensive sore on the leg, caused by intemperate habits, and of the character of those so familiarly known as "rum-legs," in a fit of despondency threw himself from the piazza of the hospital, eighty feet, which caused his immediate death. In examining the dead body, in which we found every rib on one side fractured and extravasation into the pleura, ventricles and base of the brain, &c.; we found also, on inspecting the diaphragm, a large regularly formed flat *osseous or earthy plate*, which was *completely circular*, and about two inches in diameter and a quarter of an inch thick in every part of it, flat on both sides, and *perfectly imbedded*, or as it were sewn into the middle of the muscular fibres of the diaphragm, its two planes corresponding precisely to, and being accurately covered by, those of this partition.

It is to be remarked, as suggested by M. Graefe, that where an arthritic or lithic diathesis exists, earthy deposites and calculous concretions may be expected to be found more extensively and in every part of the body.

M. Demarquay, after his investigations, comes to these conclusions: 1. *Rhinolites* may be found alone or in considerable number in the nasal fossæ, and especially in the lower part and lower meatus of these fossæ; 2. In the frontal sinus, and from thence descend into the fossæ, or into the sinus maxillare, or they may be developed in the antrum of Highmore, as mentioned by Lanzoni (*Ephem. Cur. Nat.*, deca. 3, an. 9 and 10, obs. 143, p. 267); 3. They may shut up the nares and incline the septum to one or the other side, or destroy it in

part; 4. That they vary from the size of a bean to that of a pigeon's egg; 5. That they may be isolated, as is usually the case, or enveloped in a shell; 6. That they are of a blackish, greyish, or whitish color, and have asperities or a chagreen aspect on their surface; and 7. That they may be homogeneous or may be formed on a nucleus, as on the kernel of fruit, the root of an incisor tooth, &c.

Exposed as the nares constantly are to the introduction of foreign bodies, and the more so in inspiration, it is easily conceived that calculi might be formed *entirely* by aggregation of particles of dust or fine pulverized earth inhaled from without, without any distinct nucleus, and thus by admixture with the solid depositions from the secretions of the nares, sinuses, &c., give rise to the supposition of an organic process from within the system. This idea does not appear to have occurred to M. Demarquay.

The analysis of these calculi, as given by Axman, Prout and M. Bouchardat, is:

<i>Animal matter</i> (albumen, mucilage, fibrine, fat and osmazome),	0·35
<i>Phosphate of lime</i> ,	0·8
Carbonate "	0·225
Carbonate of magnesia,	0·125
Traces of soda, muriate and carbonate of soda, and oxyde of iron.	
Mucus.	
Phosphate of magnesia.	

Thus they constitute, as M. Demarquay says, an exaggeration or excess of the normal secretions of the parts. Differing from M. Graefe, he imputes their formation not so much to an arthritic diathesis as to a chronic inflammation of the nasal fossa and lachrymal gland, causing a vitiated or altered state of the secretions of those organs. Also an abnormally contracted condition of the passages may have an influence, by the obstruction it would create to the free escape of the secretions. Among the symptoms to be noted are, a sensation of dryness and weight in the passages, obtuse and sometimes acute pain, occasionally periodical cephalalgia, &c., and finally inflammation of the parts encroached upon, erosion, caries, fetid purulent discharges, &c.

They may be sometimes diagnosed by a metallic sound imparted to the exploring instrument. The treatment, when their volume requires the aid of surgery, is the same as that for the extraction of polypi, together with a more careful attention to detergent injections and general remedies to change the morbid action.

*Successful removal of Polypi from the Frontal Sinus.*—One of the most extraordinary surgical cases on record, and one also of the most extraordinary instances of the triumph of surgical art, is that of a boy aged ten years, operated upon by Dr. C. C. Wuth, (*British and Foreign Med. Review*, January, 1846, p. 186,) for a remarkable enlargement of the left frontal sinus, with frightful protrusion and disorganization of the entire left eye; both of which had existed nine years, and caused constant severe pain in the head, loss of rest, emaciation, &c. Many practitioners had been consulted and various remedies used, but no one it appears had ever suspected the true diagnosis, until Dr. Wuth suggested that the whole tumor and deformity arose from polypi within the frontal sinus. It is proper to

state that the socket of one orbit had become so much displaced forward by the internal pressure, that the left eye was almost entirely extruded from it, presenting a most hideous aspect. The globe in fact lay on a level with the back of the nose, and projected laterally over the cheek bone on the left side, while downward it reached to the point of the nose. The lids for three years had ceased to cover it, and the protrusion of the ball was the greater from the orbicularis acting now as a powerful sphincter, excited into this forcible antagonism, Dr. Wuth thinks, in order to resist the pressure of the tumor from within. The cornea was partially ulcerated, the vessels of the conjunctiva varicose, and a constant flow of tears came from the parts. The regions of the frontal and nasal bones were greatly protruded, and the left side and the back of the nose formed a flat surface by reason of the pressure, so that the nostril on that side was nearly closed. The skin was thickened and doughy to the touch, and the left eyebrow deviated upwards at a great distance from the right, and had at its outer and under part a small opening, from whence there constantly oozed out a whitish mucous fluid. An attack of measles is supposed to have been the cause of this terrible mischief.

Dr. Wuth proceeded to operate as follows: first by a vertical incision two inches long, from the root of the nose upwards through the soft parts, and a horizontal one from this of the same length, close above the eyebrow. Dissecting off the triangular flap thus circumscribed, he next proceeded to trephine the frontal sinus, remarking in the middle of the superciliary arch a small hole in the bone, which accounted for the mucous discharge already mentioned, [and but for which salutary drain probably death would have long before ensued. T.] This oozing however had caused, in the soft parts of the neighborhood, a considerable degree of inflammation and a fungoid condition of the tissues, which gave rise to some hemorrhage. On trephining into the frontal sinus by two openings, an immense quantity of polypi protruded, being connected together like grapes, and covered with a milk-white fluid. The greater part of these were removed by the scissors. Internally they were yellow and semi-transparent, and each had two or three vessels in them, radiating off branches in all directions. In the upper portion of the sinus the polypi were of a mucous or cellular texture, and softer to the feel, but firm. Out of these could be made too ooze, by pressure, a white slimy fluid. In the middle of the abnormally dilated sinus the morbid product was denser and more opaque; and posteriorly and towards the parietes it was of a fibrous structure. The cavity terminated towards its inner and outer sides in small sinuses or cellular spaces, in which the polypi lay firmly imbedded. As the surgeon found the osseous partition which separated the sinus from the brain, so thin in fact that it yielded to pressure and imparted to the finger the pulsations (the diastole and systole) of the encephalon, great caution was required in detaching the morbid growths from it, or in the application afterwards of such cauterizing means as would not cause too much irritation. He now bored through the osseous parts from the cavity of the nose to the frontal sinus, as the ethmoid cells, conchæ, &c., and introduced a silver canula, so that the fluid collected in the sinus might flow off unconfined; and also to remedy the flow of tears over the

ball, perforated the nasal bone from without inwards, so as to meet the artificial canal previously made, and inserted in this second also a silver tube. This last was removed and closed when the tears had reacquired their natural passage. The first canula into the sinus was also afterwards removed, and the parts firmly cicatrized in the space of twelve months; by which time the globe and the bones had almost resumed their natural dimensions and position; the ulcer of the cornea also having healed and left only a leucoma, but the sight much improved. From the first night the patient enjoyed such sleep as he had not had for years. The first *six weeks* he spent chiefly in sleeping and eating, which soon repaired his exhausted constitution. The cure in fact has continued complete and perfect, now embracing a period of some years. To overcome the adhesions of the polypi, and to restrain new growths on the parietes of the sinus, Dr. Wuth properly declined the use of the nitrate of silver and employed laudanum, Goulard's extract and creosote, pencilling the parietes with a mixture of equal parts of the two former, and then applying a salve composed of an ounce of zinc ointment and ten drops of creosote spread on lint.

Dr. Wuth, from the above highly instructive case, the successful operation for which does him so much honor, deduces very naturally the following conclusions: 1. The power of vision to continue under general traction and elongation of the optic nerve. 2. The frontal sinus may be enlarged to an enormous extent, which, in this case, was equal to the *volume of three hen's eggs!* 3. The return of this osseous cavity almost to its normal form. 4. The complete division of the supra-orbital and frontal nerves without injuring vision. 5. Pain is not a pathognomonic sign of the malignant or benignant nature of a swelling—a fact illustrated also by cases of induration of the mammae and other organs, which, by their spontaneous disappearance, show their non-malignant nature.

There is a case of a gentleman now living in New York, aged about 55, who has been frequently seen by Dr. Mott, myself and others, and in whom, in fact, there has existed for many years such a frightful protrusion of the socket and balls of both eyes, and the whole of the lower portion of the frontal bones and outer angles of the orbits, as to have excited remark among all who have ever witnessed this melancholy deformity. The sight of both eyes is now entirely lost, as both are amaurotic, though both balls can yet be covered by the lids, not however without difficulty. The organization of the substance of the tunics of the globes is not materially altered, though they both, and especially one, stand out on a level with the cheek. Is it not probable that this case is one of polypi in the frontal sinuses? Some fifteen years ago it was seriously stated, that one day, in a violent fit of sneezing, one globe actually came out of its shallow socket, and hung upon his cheek by its optic nerve until replaced by a physician who happened to be present! This does not now seem in the least marvellous, after reading the case of Dr. Wuth, above. T.]

## ARTICLE II.—SINUS MAXILLARE.

§ I.—*Perforation.*

The maxillary sinus is frequently the seat of diseases, to relieve which perforation has repeatedly been resorted to. *The worms*, which Bordenave, Fortassin, Heysham, &c., state to have encountered here, would unquestionably exact this operation if it were possible to recognize the existence of these animals during the life of the patient. The same remarks apply to *peletons of adipocire*, which, as it has been stated, sometimes form in this part, also to *balls* which, as Ravaton (*Chir. d'Armée*, p. 114) and M. Petit (*Journ. Hebdom.*, t. II., p. 47) have seen, may get caught here and remain even as long as 25 years; but it is especially with the view of removing *abscesses*, *hydropsy*, ulcerations, and *fungus, fibrous*, and carcinomatous tumors, also *polypi*, *necrosis*, and *caries* of the cavity, that this operation is had recourse to.

A. Jourdain, who about the middle of the last century so strenuously insisted upon the utility of medicated *injections* through the natural opening of the sinus, and upon the inutility of its perforation in almost all its diseases, has not succeeded, notwithstanding the numerous arguments which he advances, in convincing practitioners, and his doctrine at the present day is advocated by no one. On one hand it has been found most frequently, whatever may have been said on this subject, that it is extremely difficult to discover, at the middle of the median meatus of the nasal fossæ, the entrance of the sinus by means of a sound; and on the other hand that this opening, which is more frequently obliterated in consequence of disease than in any other manner, would afford no assistance even though it should be re-established, and that taking all things into consideration, the artificial perforation, which is less difficult and more certain, ought to have the preference.

B. *Perforation of the Alveoli.*—Of the different methods of effecting the opening into the sinus maxillare, the most ancient is not, as is generally believed, that which consists in penetrating through the alveoli of the molar teeth. Molinetti, who wrote in 1675, says, that in a patient who was tormented with agonizing pains, a crucial incision was made into the cheek, and that by means of the crown of a trephine they penetrated into the antrum highmorianum, which was the seat of an abscess. It is also an error to attribute the honor of this operation to *Meibomius*. Zwingler had, after the extraction of several necrosed and loose teeth, cured a caries of the maxillary bone, by dilating the diseased alveolus with prepared sponge. Ruysch makes the remark that Vanuessen could not succeed in curing a polypus until after having extracted several molar teeth and cauterized their alveoli with a red hot iron, so as to be enabled to pass the finger into the maxillary sinus. Some years subsequently, W. Cowper, in 1697, according to Drake, who has formally recommended it, perforated the alveolus of the first molar and penetrated into the sinus with a kind of stilette, in order to be enabled to inject liquids into it. Moreover Meibomius, whose researches were published in 1718, is so far from having invented this method, that he limited himself

to the extraction of a tooth, in order to give issue to the matters accumulated in the sinus, with the perforation of which he appears to be wholly unacquainted. It was also the practice that Saint-Yves followed with success, in a patient who for a long time had had a fistula, accompanied with destruction of the floor of the orbit; so that it was not until Cheselden had revived this operation that the attention of practitioners was directed towards it. This surgeon recommends that we should rather extract the third or the fourth than the first or the second molar teeth, as indicated by Juncker, and that if there exists an osseous fistula we should content ourselves with enlarging it in place of piercing through the bottom of the alveoli. Since that epoch the perforation of the alveoli has been modified by different authors. Heuermann, who also prefers the alveolus of one of the last teeth, recommends, if the pus does not immediately escape, to perforate the sinus with a probe, and to place in the opening a canula, in order to prevent its too speedy obliteration. Bordenave judiciously remarks, that, with the exception of the first, all the molar teeth correspond to the sinus, and that consequently if there is one of them carious or more painful than the others, it is this which should be removed by preference, but that it is advisable to extract the third if they are all equally sound. On the other hand he recommends that we should extract all those which are altered, provided that they can no longer be of any service. A canula of lead appears to him to be more suitable for keeping, during a certain space of time, the aperture open, than the sound and bougies, and he does not think, moreover, that the process should be the same in all cases. Desault, who adopted the recommendation of Bordenave, commenced the operation with a perforating trephine, mounted upon a many-sided handle, and terminated it with another instrument of the same kind, but the point of which was blunt, in order not to wound the opposite wall of the sinus. According to B. Bell, if we have our choice we ought to extract one of the posterior teeth, and in the interval between the dressing keep the opening shut by means of a stopper of wood. Richter perforated the alveolus with a trochar: he cautions us against leaving the canula which is placed there open, because portions of the food might get into it and be introduced into the sinus. Deschamps recommends that we should leave this canula permanently in, fastening it by means of a thread round one of the teeth. In conclusion, the method called that of Meibomius, which possesses the advantage of placing the opening at the most depending point of the sinus, of leaving no visible cicatrix at the exterior, the execution of which, moreover, is as simple as it is easy, and preferable to every other when there exists a carious tooth, ought, in my opinion, to be rejected under contrary circumstances, and where the alveoli have for a long time been divested of their small bones, and become entirely obliterated.

C. *Method of Lamorier.*—Lamorier recommends in such cases that we should penetrate into the sinus maxillare, immediately below the zygomatic process, between the cheek bone and the third molar tooth. This is the point which corresponds to the summit of the cavity, where the walls of the sinus present the least degree of thickness, and where it may be reached with most facility. An as-

sistant, provided with a blunt hook, draws the labial angle outwards and upwards. The operator incises the fibro-mucous membrane which covers the bone, at the point designated, by means of a scalpel or good bistoury; then perforates the osseous wall with a solid pointed instrument; enlarges the opening as much as he judges necessary, and finishes by introducing into it a tent of lint.

D. *Method of Molinetti.*—Other surgeons, going back to the operation of Molinetti, have recommended that we should first divide the cheek between the projection of the malar bone and the suborbital foramen, then to penetrate through this wound into the interior of the sinus; but unless we are forced to do so by circumstances, we should avoid this division of the external soft parts.

E. *Method of Runge.*—In place of perforators, one sharp-pointed and triangular, the other blunt, invented by Desault for this kind of operation, Runge, who had performed it in the year 1740, made use simply of a strong scalpel, which, in order to enlarge his first puncture, he took care to turn four or five times upon its axis. The trephine which C. Bell uses for the same purpose, has neither more nor fewer inconveniences than the scalpel of Runge or the perforating trephine of Desault.

F. *Method of Gooch.*—In a patient who had no longer any molar teeth, the idea occurred to Gooch of perforating the antrum highmorianum on its nasal wall, and of inserting therein a leaden canula. Ol. Acrel had already made use of a process very analogous: that is to say, that after having operated in the manner of Cowper, he inserted through the nose another canula into the sinus, which had a fistulous opening upon that part of it.

G. *Method of Ruffel.*—A buccal fistula of the sinus maxillare suggested to Ruffel the idea of penetrating that cavity with a trochar, and of compelling it to come out above the gum, in order thereby to establish a counter opening. A seton was then introduced and kept in this passage during the space of six weeks, with such benefit that success crowned the enterprise of the surgeon.

H. *Method of Callisen.*—Callisen, who adopts the seton of Ruffel, and imitated in this by Zang, thinks with reason that if the fluctuation should become perceptible at the vault of the palate that the artificial opening should be established there. Busch and Henkel have perfectly succeeded by means of a meche introduced through a fistula in the floor of the orbit, and brought into the mouth through an opening in the alveoli. Bertrandi proceeded in the same manner, with the exception of not using the seton, in a patient who could not open his mouth and who also had a fistula in the orbital wall of the sinus.

I. *Method of Weinhold.*—In the process which is attributed to Weinhold, the surgeon first directs his instrument to the upper and outer part of the canine fossa, directs it obliquely downwards and outwards, carefully avoids the branches of the suborbital nerve, perforates the sinus and then places a roll of lint in the wound. If the sinus has no other issue, Weinhold recommends that we should perforate it through and through, either by pushing the first instrument through the palatine vault into the mouth, or by means of a curved needle above the alveoli, when we wish to place the counter opening external to the gum. An eye which both instruments

have, enables us at the same time to pass through the sinus, the conducting thread of a meche of lint destined to perform the duty of a seton, and which is besmeared with any ointment that may be suitable.

J. This is a method, as we perceive, which is quite similar to that of Ruffel or Henkel, and which may be made trial of as well as that of Desault or Lamorier. It is also analogous to that of *Nessi*, who, after having freely laid open the sinus through the mouth, perforates it with a trochar and proceeds to destroy also its anterior wall to a considerable extent below the cheek bone, or in the canine fossæ.

K. *Appreciation*.—In conclusion, the perforation of the maxillary sinus is performed at the point of election or at that of necessity. The first may vary according to the taste or ideas of the operator. The other, on the contrary, is determined by circumstances. In cases of abscess, hydropsy, fistulas, and ulcerations, we almost always operate at the point of election. In such cases, however slightly one of the molar teeth may be diseased, it is to be extracted as well as the neighboring tooth; we then divide the gum down to the bone; outwardly, inwardly, posteriorly, and in front, as if for the purpose of forming thereby a square-shaped flap, and then isolate it entirely from the surrounding tissues; after which the alveoli are to be perforated by means of the instruments of Desault, and an opening made sufficiently large to enable us to penetrate with the finger into the sinus. Boyer, who follows this process, insists with reason upon the necessity of never making the dimensions of the opening too small. Should all the teeth be perfectly sound, or should the patient have lost them for a long time, and the alveolar border, rounded off and smooth, should have preserved all its solidity, the method of Desault or Lamorier would deserve the preference. Upon the supposition that this would not succeed, there would be plenty of time to adopt that of Meibomius, which it cannot be denied is incomparably more painful and more formidable to the patient.

L. *The Author*.—If, as happens frequently, and an example of which has been published by M. Sauvé, (*Bull. de la Fac. de Méd.*, t. V., p. 9,) the sinus is distended by any liquid, its anterior wall, swollen out in the form of a border under the cheek, is in general so soft that a bistoury or scalpel perforates it without any difficulty. The operation is then extremely simple. Having freely incised the superior part of this border transversely between the cheek and the malar bone, I excise its inferior portion with a second cut of the bistoury. The loss of substance thus made remains fistulous, and prevents the sinus from filling up a second time. The three patients whom I treated in this manner were promptly cured.

## § II.—*Foreign Bodies.—Polypi.*

It is also through the anterior wall of the sinus that we must penetrate if we have to extract only a foreign body, as for example, a ball, or shot, or some splinters of bone. When, on the contrary, we wish to remove a polypus, fungus or necrosis, prudence suggests that we should attack it at the point towards which it appears to have naturally inclined, or which it has most seriously altered. Du-

bertrand found that he could succeed in this manner in extirpating a polypus of this kind, by uniting two alveoli by breaking through their septum, and then removing the fragments of carious bones; while Caumont was obliged, in a patient who had undergone a similar operation without benefit, to attack the tumor where it showed itself at the canine fossa, and Chastenet on the other hand, found it necessary in the case cited by him, to destroy almost the half of the maxillary bone with its palatine process, in order to effect the same object. However this may be, when the antrum high-morianum is opened with the sole view of giving a ready egress to the matters which it secretes or exhales, the requirements of the operation are reduced to simple detergent, astringent, antiseptic or dessicative injections, until the bottom of the wound is covered with cellular granulations. Should there exist at the same time necrosed osseous fragments, these are to be destroyed. In such cases it frequently becomes advantageous to prolong the incisions, to enlarge the openings, and to have recourse to the chisel, the saw, cutting pliers, gouge and mallet. The same thing takes place in cases of exostosis, and every other alteration of the osseous tissue. When the sinus encloses a polypus, the tumor is to be treated in the same manner as if it were in the nose, with this difference, that the tearing of it out, which is almost always applicable, rarely fails to effect our object, and that we cannot perceive at least what advantage would in this case be presented by the ligature, which was still employed by Sylvi, (*Soc. de Santé de Lyon*, p. 121, 1798,) for a polypus, which projected at the same time into the mouth, and into the zygomatic and temporal fossæ.

After having isolated and denuded its periphery, and laid bare its pedicle or base, it is then to be secured by a polypus forceps, or if we should find it more convenient, by the forceps of Museux, frequently used by Dupuytren. We then tear it out by drawing it towards us, or what is as well, by twisting it upon itself. Should it not possess sufficient firmness to resist the action of the forceps, we remove it by excision after having forced it to yield as much as possible; and if any bridles or osseous lamellæ should interfere with its extraction, they should be divided without hesitation, unless, however, there should be some danger in meddling with them. When it has more breadth than prominence, when instead of a polypus we find fungosities or any other degenerescence, we are sometimes obliged to remove them layer by layer; either by means of the ordinary or blunt-pointed bistoury, by the scalpel with a truncated, short and broad point, somewhat curved on its flat side, like the knife of F. de Hilden, or that devised by Pelletan and eulogized by Boyer, or finally by means of any other appropriate instrument, as for example, by a kind of cutting scoop, like that of Bartisch. On the other hand, should the tumor be of too large a size to be readily extracted at the maxillo-labial groove, it would be necessary to lay open the lip freely throughout its whole height, or one of its commissures in the direction which was most suitable. The twisted suture in a wound of this kind renders agglutination so easy a matter, that we should be really culpable in neglecting it whenever it should appear that the operation would be thereby simplified. Sylvi, by cut-

ting into the temporal fossa, in order to extract and cauterize a remaining branch of a polypus in the sinus, lost his patient at the expiration of three weeks ; but Cartier, (*Soc. de Santé de Lyon*, pp. 122, 123,) after a similar operation, had the good fortune to cure his. Caustics may be used to destroy whatever arrachement and excision have not enabled us to remove. The mineral acids, the butter of antimony, and better than all this, the nitrate acid of mercury, introduced by means of a pencil wrapped in rolls of lint, have the advantage of not transmitting their action to a distance like the actual cautery, which at this point in particular is to be especially dreaded, because of the proximity of the eye. It is however important not to be forgotten, that Garengeot could not succeed in curing a fungous mass in the antrum which had resisted repeated excisions, extirpation and chemical escharotics, except by destroying it by means of the red-hot iron. Nitrate of silver, alum, sulphate of iron or copper, and all those substances which are rather styptic than really caustic, are scarcely applicable, in fact, except to vegetations, small ulcers and tumefactions ; in a word, to alterations disconnected with the bones, and which have no malignant character. It is unnecessary to say that, should any deviated tooth be the cause of the disease, it would be necessary to proceed in search of it and to extract it immediately. The triumphs of art contain in this respect facts that are extremely curious ; such, for example, is that which Dubois has published. This practitioner, supposing that he was cutting down on a fungous tumor, saw issue out nothing but a liquid and thin matter from the maxillary sinus, which he had just freely laid open above the dental arcade. The wound soon closed up, but the tumor remained. With the assent of Pelletan, Boyer, &c., Dubois extracted three teeth, removed a large portion of the alveolar border, thus laid open the antrum in its whole extent, and found no fungus, but perceived in the upper part of the cavity, in the substance of its anterior wall, a white point, which was no other than an incisor tooth, the root of which was found to be rivetted as it were into the sinus.

M. Blasius (*Arch. Gén. de Méd.*, 3rd ser., t. II., p. 98,) also succeeded in curing a hydropsy of the sinus maxillare by extracting an abnormal tooth. A tooth of this kind, which had become imbedded in the ascending process, gave rise to the production of an enormous tumor in a patient of M. Gensoul, (*Let. Chir.*, 1833.) As to hemorrhage, these different manipulations sometimes render it sufficiently copious to oblige us temporarily to suspend the operation. Should it not cease spontaneously, the eau de Ravel, oxycrat or tamponing with small balls of lint sprinkled with colophane. or even if necessary, the iron heated to a white heat, are at the command of the surgeon and will always enable us to apply an efficient remedy. It is also for cancerous and osteous-sarcomatous tumors of the maxillary sinus that exsection and amputation of the upper jaw have been most frequently performed. In addition to the examples which I have elsewhere related, (see *Exsection of the Jaws*, Vol. II.) it is necessary to mention also that of M. Bonjour, (*Arch. Gén. de Méd.*, ser. 2nd, t. IV., p. 476,) that of M. Blandin, (*Ibid.*, t. V., p. 162, 2nd ser.,) that communicated to me by M. Chaumet, that of M. Laugier, that of Le Sage, (*Bull. de la Fac. de Méd.*, t. V., p. 258,) and one which

belongs to myself. In this last, (*Gaz. de Médecins, Prat. t. I.*, Nos. 1 and 2,) after having incised the soft parts, as has been mentioned, (see *Exsection of the Jaw*, Vol. II.,) I divided the zygomatic arch, the external orbital angle, the ascending process, then the dental arcade and the nares in the mouth, with a cultellaire saw, and removed the entire maxillary bone together with the cancer.

### § III.—*Osseous Cysts.*

Osseous tumors, tumors filled with a thin serosity, as in grenouillette, or with pus, or of a fibrous, fatty or fungous nature, or composed also of many of these elements at the same time, have been frequently noticed outside of the sinus maxillare, and even in the substance of the bones of the face. I have seen, like Chaussier, exostoses in the lower jaw. M. Diday (*Thèse de Concours*, 1839, p. 32,) mentions one situated in the vault of the palate. M. A. Cooper saw one which caused suffocation by pressing upon the epiglottis. Runge, who was one of the first that spoke of these tumors, states that his father and himself have met with *osseous tumors in both jaws*, and that they frequently derive their origin from the point of the root of a tooth. It is also probable that those alleged lymphatic congestions whose walls were found as *thin as parchment*, and which M. Brodie, (*S. Cooper, Surgical Dictionary*, p. 201, 7th ed.) as well as Kirkland, places in the antrum highmorianum, also belong to the same description of disease. Has not Callisen committed a like error in speaking of those tumors with separate compartments, which, according to him, require the extraction of several teeth? Siebold, who saw an osteo-sarcoma between the laminæ of the sinus, and who extected it without causing any pain, and cured his patient, has distinguished better than his predecessors the actual location of this disease. In fact Runge, who in other respects describes it sufficiently well, and does not omit to mention that by pressing it with the finger it yields, but immediately reacquires its dimensions with a *bruit*, ranges it among diseases of the sinus. Sprengel also charges him with several times having inserted in his dissertation, through inadvertence without doubt, *lower jaw* for *upper jaw*. In this respect, the learned historiographer was evidently deceived. It is certainly to the lower jaw that Runge has reference when he designs to speak of it. Only he has made use, erroneously and improperly, of the term *sinus*, to designate tumors which are situated external to these cavities. These isolated facts, moreover, had not attracted the attention of any one, and it is to Dupuytren to whom we are indebted for having been the first to give in his clinical lectures exact notions on the disease in question. I have now seen a great number of examples. Though the tumor may be situated outside of the sinuses, since it is more frequently seen in the lower than in the upper jaw, and in the ascending process as well as in the substance of this last, nevertheless almost always has certain relations with a diseased condition of the teeth. M. Diday, (*Thèse de Concours*, 1839, p. 36,) adopting this idea, seems even to think that osteo-serous cysts of the face almost always proceed from a dental follicle, and that the greater part of them are disconnected with the substance of the jaw. Though

they are similar in form and external appearances to carcinomatous or fungous tumors, they differ from them especially in this, that they are readily cured by surgical means. Analogy authorizes us to suppose that the various kinds of treatment extolled for lesions of the maxillary sinus would be equally applicable to them ; that by extracting the carious teeth in the neighborhood and opening into them at the inner side of the lips or cheeks when they are so situated as to allow of it, we should effect the cure of a great proportion of them ; so that there would be no great mischief from confounding them with polypus or other tumors developed in the antrum highmorianum, as happened to the father of Runge and to Dupuytren himself. But up to the present time at least, I have always found it to suffice, as Dupuytren also did, to incise them freely in the mouth or through the cheek, then to throw up injections, and to insert daily a meche or tent of lint in the wound, in order to bring about their diminution and resolution.

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## CHAPTER V.

### AUDITORY APPARATUS.

#### ARTICLE I.—EXTERNAL EAR.

##### § I.—*Otoraphy.*

Pibrac and those who like him, in the last century, condemned the abuse of sutures, were wrong in proscribing also those of the ear. Though it be true that in wounds of the pavillon of this organ, adhesive plasters, position and a bandage, sometimes suffice for procuring a healthy cicatrization, it is also true that these means are for the most part uncertain, and that the suture is infinitely preferable to them. When it is used, whether in the form of the interrupted or whip suture, or in any other manner, I see no reason why the skin only should be included, and that we should place as many points of suture behind as in front, in order to avoid the cartilage, as the ancients recommended. Leschevin has clearly shown, and M. H. Larrey has since proved, that there is no inconvenience in comprising the whole substance of the pavillon in the nooses of the thread. All wounds, for example, by a cutting instrument, and which divide the external ear through and through, ought to be immediately reunited by the suture. Ancient divisions, after having their borders abraded, should be treated in the same manner, conforming ourselves in other respects to the rules laid down in the article on harelip. (See *Otoplasty*, Vol. I.)

##### § II.—*Tumors of the lobe.*

The lobe of the ear may be the seat of tumors of a large size ; those that are pyriform, indolent, homogeneous or somewhat granu-

lated, fibrous or *elephantine*. A woman had one of unequal size on each ear ; having removed by a V incision into the sound tissues, that of the right side, which was of the size of a nut, I was enabled to reunite the wound by two points of suture, and to cure the patient in three days. It would appear, moreover, according to M. Campbell, (*Arch. Gén. de Méd.*, 2d ser., t. VI., p. 110,) that this description of tumors, which frequently originate from the helix, is apparently endemic at Nipel.

### § III.—*Deformities of the Meatus Auditorius.*

A. When *atresia* of the passage of the ear is complete, and that its source lies in the temporal bone itself, a double example of which I saw in the dead body of a child four years of age, and a second instance on one side only in another child of from ten to twelve years of age, it is incurable, and yields to no kind of medication. To whatever degree, on the contrary, the *contraction* may have proceeded, even though it scarcely admits of the passage of a needle, as was seen by Lamétrie, or that the coarctation is trifling and occupies only one point of the passage, or has invaded the whole extent of the canal, we should make an attempt to remedy it by dilatation. *Caustics*, which were preferred by some ancient authors, might under these circumstances become dangerous and would rarely effect the object in view. The canulas, sounds or tents of larger and larger size, that are used, should be still continued a long time after the cure, and even sometimes during life ; for the wall of the canal retains almost always a great tendency to contract again. In certain cases the walls of this canal, when simply lying in juxtaposition to each other, cannot be effectually separated except by a metallic canula of a diameter corresponding to that of the auditory passage in the normal state. If the deafness depended evidently upon an anomaly in the curvature of the cartilaginous prolongation of the ear, it could be remedied by placing a gold canula permanently in this passage, an example of which is related by Boyer in his practice.

B. More frequently the external ear is shut up by a membrane or a sort of diaphragm. Unless it should be very remote from the pavillon, this membrane should be laid open by a crucial incision with the bistoury. The flaps are afterwards to be excised with the same instrument or a small pair of scissors, while they are successively raised up by means of a hook. Others have recommended that it should be perforated with a trochar, and its destruction completed by the aid of dilating bodies ; but this method is not as good as the first. Incision, which Paul of Egina adopts when the accidental diaphragm is deeply situated, as in the preceding case, rejected by F. ab Aquapendente under the pretext that it incurs the risk of penetrating into the internal ear, is not proscribed at the present day, except in cases in which it appears to touch the membrane of the tympanum. In these cases we follow the precepts of J. Fabricius, and have recourse to caustic, and the best without contradiction is the lapis infernalis. Leschevin recommends that it should be inserted in a piece of quill, and applied to the bottom of the passage through a silver canula. Three or four cauterizations, at intervals of two or

three days, are generally sufficient. If, however, the septum should be very thick, it would be better, after the manner of Leschevin, to perforate it at whatever depth it may be situated, by means of a very short trochar, whose stilette passed but a very slight distance beyond the end of the canula.

C. It is by the same treatment that we should attack every kind of atresia, complete or incomplete, which is imputable only to defect of conformation of the soft parts, and which is not purely membranous. As soon as the instrument has passed beyond the obstacle which the sudden removal of the resistance indicates, the trochar alone is to be withdrawn, in order to use its canula for the introduction of a bougie to the bottom of the auditory passage, which is to be renewed daily, gradually increasing its size.

#### § IV.—*Foreign Bodies.*

A. An infinite number of varieties of foreign bodies may become introduced in the auditory passage, and an infinite number of means have been proposed for their extraction. Archigenes, in compelling the patient to hop on one foot, and to take sternutatories, had the same intention as Celsus, who recommends us to press his head upon a table and to shake it with force, either by raising him up by the feet or striking his sound ear, or letting suddenly fall again, after having raised it, the body which supports him. Alexander of Tralles has suggested the idea of sucking upon them with a tube; and Mesué, who has revived this, like J. Arculanus, has devised for this purpose another instrument, destined exclusively to pump out liquid matters. The suction pump, the instrument invented by M. Deleau, and which can serve to withdraw the air, serosity, pus, &c., as well as for injections into the ear, are referable to the same principle. Leschevin, who alledges that the air contained in the canal of the external ear is the ordinary cause of the buzzing sound and tingling in the ear, had been anticipated by Reusner, who, in order to remedy this inconvenience, recommended a small silver canula left permanently in the auditory passage.

B. *Hardened wax* is dissolved very well by means of oil of sweet almonds, as is remarked by Avicenna, and better still by means of tepid soap and water, or even in pure water, if we believe in the experiments of Haygarth, who rejects oils as less serviceable. A solution of sea salt, as eulogized by J. E. Trempel, also dissolves it. Consequently, when deafness is produced, as so frequently happens in persons of a certain age, by the accumulation of this material, we cause to be introduced several times a day into the ear one of these liquids, either by means of a syringe, or upon cotton which has been saturated with it, and when it has become softened or detached it is removed by means of a scoop,

Duverney, (*Traité de l'organe de l'Ouie*, 3d part, p. 156, 157, 1683), states that he had seen in eight or ten instances the wax so inspissated as to resemble plaster, and filling up exactly the bony and cartilaginous passage of the ear. Distinguished surgeons had communicated to him more than thirty similar examples. This species of deafness, according to him, is the most common and the most easily

cured. A famous surgeon of Mons who obtained so much renown for the cure of deafness, undertook only the treatment of this form of the disease. In a patient who had been affected with deafness for a long time, the cavity of the tympanum had become excessively dilated, and the petrous portion of the temporal bone absorbed. These two singular affections were produced, says M. J. Cloquet, (*La Clinique des Hôpital.*, t. IV., No. XXI., and *Séance Acad. Méd.*, 1829,) by the development or accumulation of a ceruminous matter which had become indurated in the interior of the cavity of the tympanum, and which was thrown off in scales, forming a species of false membranes. In another case noticed by M. Jobert, (*Revue Méd.*, June, 1830, p. 414,) the cerumen which filled up the cavity of the tympanum, had transformed the petrous portion into an osseous dilated cavity, in which there remained no vestige of the conformation belonging to the middle and internal ear. The woman mentioned by Bartholin, (Act. Haffn., t. I., obs. 45, p. 82, and Planque, t. XVIII.) experienced severe pains, especially in the petrous bone. In cleaning the right ear she extracted from it, together with fetid matters, a quantity of sand, and then experienced no more pain.

C. Should bugs, earwigs, and other insects, (Wolckamer, Rayger, Lieutaud, (*Sauvages, Nosol.*, &c., t. IV., p. 232,) Alteyrac, De la Motte, Drouin, and Acrel, have noticed worms here; M. A. Severin, Drouin, and Planque, caterpillars; Ravaton and Wolckamer earwigs; Binninger and Schenk, the larvæ of flies,) which sometimes get into the bottom of the auditory passage, not become entangled in the cotton and pitch, as had already been recommended by Hippocrates, or in a piece of lint saturated with turpentine, which are introduced, in order that they may become caught in it, we may after the manner of Hameck, endeavor to kill them by pouring into the ear the oil of bitter almonds, or like Rhazes, a decoction of peach-leaves. The decoction of *Sedum palustre*, used by Acrel, would produce the same effect. But it is useless at the present day to combat with Verduc, who thought that the pippin apple possessed the property of drawing them to the outside; or with Leschevin, who boasted of the half of a potato being a special antidote for the earwig. It is nevertheless true that that milk appears to possess the property of attracting an earwig, and that M. H. Berard, as well as Alteyrac, succeeded in effecting the expulsion of worms from the auditory passage, by holding a piece of meat upon the ear. It is to be mentioned also, that whether living or dead, we should endeavor to seize hold of these insects and extract them by means of the forceps.

D. As to solid foreign bodies, of a certain volume, and which Paul of Egina has properly ranged into two classes, namely, those which absorb humidity, and may become distended in the parts, and those which are impermeable; (MM. Betbeder, Bégin, and Champion, speak of oat-seeds and barley-ears; Dupuytren, of a piece of pencil; De la Motte, of a pea; Saucerotte, of beads of a rosary; F. de Hilden and MM. Dumoustier, Champion, Faber, and M. Mauoir, of cherry-pits,) they demand all the attention of the surgeon. Acute inflammation, abscesses, caries of the bones, cerebral accidents, and violent pains of the head may be caused by their presence. At the opening of the dead body of a patient who died in this manner,

Sabatier found the os petrosum perforated, the dura mater inflamed, and an abscess, together with a *small ball of paper*, which was the cause of all the difficulty, in the substance of the bone itself. In a young girl who had suffered for a long time paroxysms of convulsions, and all kinds of nervous accidents, F. de Hilden (Bonet, *Corps de Méd.*, t. II., p. 405, obs. 4) effected a complete cure by extracting from the ear a foreign body which had been introduced there seven years before. An analogous observation was published in 1829, and scientific collections are crowded with similar examples.

E. M. Larrey nevertheless remarks that in a soldier whom he treated, the foreign body had remained in its place during ten years without producing any accidents. It is well also not to forget that these different bodies, which may be a bean, a small ball of bread, wood, shot, glass, iron, a small pebble, pin, needle, clot of blood, &c., *sometimes come out of themselves* when the first accidents have passed over, after having produced a suppuration more or less abundant. An important point to be noticed in practice especially is this, that patients frequently, as well as their friends, are determined in persisting that there is a foreign body shut up in the ear when it is completely free. A woman greatly alarmed brought her child five years of age to one of the public cliniques in the capital, in order that she might have removed from his ear a cherry pit which had been there for the space of twenty-four hours. All kinds of attempts were made, and these being uselessly repeated every morning for three days, caused excessive pain, inflammation and fever, until when it became hazardous to do anything more, and the idea suggested itself of ascertaining whether the organs of the little patient actually contained the pit sought for, it was perceived that there was nothing there. Such mistakes have frequently given rise to the most serious accidents. Boyer relates two instances; I have met with three or four, and there are few physicians who have not had occasion to witness the same.

F. If by *inclining the ear downwards* we cannot extract these solid foreign bodies, we must endeavor to reach them by means of the forceps when their form is elongated or flattened. A small hook is sometimes the best instrument that can be used for removing those which have a certain degree of softness. It is for these last also that it is advised to divide them and reduce them into fragments by means of a narrow and elongated myrtle-leaf probe, in order afterwards to withdraw them by piecemeal.

G. *Fragile bodies* exact much more precaution. A false pearl, says Boyer, which had become broken in the auditory passage, by a surgeon who was endeavoring to extract it, put the life of the patient in danger, and caused a suppuration of the tympanum and the loss of hearing. We must therefore undertake their search by means of a delicate scoop, which however is to be of sufficient solidity, by following the lower wall of the canal in order to introduce it below the body which is to be removed, and afterwards making use of it as a lever of the first kind, by depressing its handle at the moment of making the extraction. The scoop modified by M. Leroy, which is terminated by an articulated beak which is to be introduced straight, and which is to be elevated by the turn of a screw when it has

passed beyond the foreign body, almost always succeeds in such cases. A noose of lateen or brass wire, or a hair pin, much esteemed by M. Champion, if introduced and brought out in the same manner, would be equally efficacious.

H. A *cherry pit* which had resisted all such manœuvres, finally germinated in the ear to such extent, if M. Donatus is to be believed, (*De Méd. Hist. Mirab.*, lib. II., cap. 22, fol. 77,) that it then became practicable to extract it by drawing upon its twig; but there is no necessity of pointing out the improbability of a statement of this kind. Verduc (*Opérat. &c.*, p. 224, 1721,) however, also states that a pea had germinated in the auditory passage, and M. Dumoustier (*Reflex. sur les Corps Etrang.*, Strasbourg, 1810, p. 5,) makes the same remark of an oat seed as Donatus does of his cherry pit. In such cases the only resources applicable would be to oppose the symptoms with energy or to prevent them, to as great a degree as it was in the power of art to do, and then to await the suppuration.

I. *The process of F. de Hilden*, as adopted by C. de Solingen, and which has been properly rejected, consists in introducing a first canula down to the foreign body, then through this last a second canula, intended to secure this body by means of the teeth which are placed upon its extremity, while a kind of screw-ring or gimlet is inserted to extract the whole at the same time. That which the scoop could not do would not be more advantageously effected by this apparatus, which is much better calculated to force the foreign body into the cavity of the tympanum than to bring it to the exterior. The eyed ear-picker of F. de Hilden, Ravaton's hook, Brambilla's scissors, Leschevin's hook, the flattened probe of Andrieux, and the curved forceps of Dupuytren are not as valuable as the forked pin of M. Champion, and the articulated scoop of M. Leroy. In two instances M. Bégin, (*Elem. de Pathol.*, 2nd edit., p. 521,) has succeeded without any difficulty in extracting cherry pits which had got introduced into the *bottom of the auditory passage*, by means of a small slender iron rod slightly curved in the form of a scoop: a vibratory movement made upon the instrument caused the expulsion of the foreign body.

J. In difficult cases *Paul* made a semilunar incision behind the concha, in order to penetrate to the bottom of the passage, by opening through the cartilage from without inwards, and to be thus enabled to force out the foreign body from within outwards, by means of a suitable instrument. This operation, again recommended by Dionis and Verduc, is now wholly abandoned. It should not, however, perhaps, be entirely rejected when the danger presses, and all other means have been fruitless.

K. *Injections* thrown in with some force, eulogized by M. Dumoustier (*Thèse*, Strasbourg, 1810, p. 5,) and M. Mayor, (*Journ. des Conn. Méd.*, t. III. p. 13,) already employed at the time of Celsus, and censured by Scultetus, and which had been used with advantage by a surgeon of the acquaintance of Morgagni, (*Lettre XIV.*, p. 334. Art. XIII.) would be applicable if the foreign body had but little size, or was light. It is however obvious that the douche and injections through the Eustachian tube, as recommended by M. Deleau, (*Gaz.*

*Med. de Paris*, 1835, p. 303,) could not succeed unless the membrane of the tympanum was ruptured. We must always, moreover, before commencing the operation, and whether we use this or that instrument, instil some drops of oil into the ear, in order to render the parts smoother, and less irritable. Afterwards, nothing remains to be done, except to throw up emollient injections during the space of some days; unless, however, the manipulations made use of should induce us to apprehend the subsequent development of formidable accidents. Under such circumstances, the antiphlogistic treatment with hypnotics and calmants, should the pains be acute, become indispensable.

[*Foreign Bodies—Ear*.—Mr. Carpenter, of Castelcomer, (*Dublin Medical Press*, June 20, 1841,) has met with remarkable success in detaching, and then extracting foreign bodies wedged against the tympanum, in the meatus of the ear, such as garden peas, pebbles, &c., by injecting cold water with force into the passage, by means of a syringe containing two ounces or more. T.]

### § V.—*Polypi*.

A. All the different modes of treatment which have been adopted for polypi of the nasal fossæ, have been prescribed also for those of the ear. Aranzi alleges that they may be cured by means of red precipitate ointment. De Vigo employed by turns for this purpose, the *red hot iron, caustics*, and the ligature and forceps. Paul removed them with a bistoury made expressly for this purpose, or by means of his pterygotome. G. de Salicet cauterized their root, after having ligated them with a horse-hair or silk thread. The ligature and extirpation are almost the only two methods employed at the present day.

B. *The ligature*, which F. de Hilden, Marchettis and Purmann adjusted by means of a silver plate curved in the form of a forceps, is rendered more practicable, says C. de Solingen, by previously traversing the base of the tumor by means of a thread, as a substitute for an erigne. It is in reality applicable only in a very small number of cases, and for those polypi which have a narrow pedicle and in near proximity to the pavillon. It is executed by means of a hempen thread and the canula of Desault, or by the process of F. de Hilden, as modified by Solingen, or what is still as good, by introducing with the forceps, and causing it to pass in with a probe, a running-knot or noose of the thread as far down as to the root of the polypus. After the ligature is placed, by whatever mode it may be, its two ends are introduced into a knot-tightener, and from this moment the operation has nothing particular.

C. *Excision* is practicable under the same circumstances, and almost in all cases where the ligature may be made trial of. The polypus having been secured with an erigne, we draw it towards us, while reversing it slightly in order to lay bare its root and divide it with one cut of the bistoury. De Lavauguyon, B. Bell, &c., who prefer this to the other methods, have not found it necessary in order to perform it, to make use of the hook-shaped knife of F. de Hilden; but it is evident that the narrow, blunt-pointed scissors, which are slightly curved flatwise, could be advantageously substituted for the bistoury.

D. As to arrachement, the only method in my opinion which can be advantageously applied to polypi whose roots are deeply situated, and which, if necessary, would answer also for the others, it may be effected by means of the ordinary hooks, and the eyed scoops, which are thin and garnished with teeth. The *speculum auris* of G. Fabricius, that of Cleland, as well as all those which have been proposed before and since are useless, if not injurious. Hooks now take their place. The surgeon opens them gently, inserts them between the tumor and the walls of the canal, which he carefully dilates; causes them in this manner to glide as deep within the cavity as possible, and when the polypus is firmly seized he turns them upon their axis, and then tears out the whole with a half drawing and half twisting motion. The blood which escapes at the moment conceals the parts to so great a degree, that in most cases we are obliged to defer till the next day the exploration necessary to ascertain whether there exists or not, anything more in the auditory passage. This hemorrhage, however, is never dangerous. A tent of lint besmeared with cerate, or a pledget of lint of the same kind, to prevent the bleeding surfaces from being irritated from contact with the air, form all the dressing that is required, and which moreover is always made use of after extraction of polypi from the ear.

E. However little there may remain of the heterogeneous tissue after the operation, we must endeavor to destroy it, not with the hot iron as recommended by G. de Salicet and F. de Hildén, &c., but by means of caustics, which, in our time, generally have the preference.

The canula of J. de Vigo, which is to have an opening on the side, after the advice of Marchettis, Verduc, &c., enables us, it is true, to apply the cautery exclusively upon the diseased point; but as we are sometimes under the necessity of acting upon large surfaces, or very near the membrana tympani, the actual cautery must here necessarily be attended with some degree of danger. Nothing, on the contrary, is more simple than to reach the polypus through the same canula by means of a hair-pencil besmeared with butter of antimony, nitrate of mercury or any other caustic, even supposing that the lapis infernalis could not be substituted for these different articles. Instances of polypi of the ear cured by extraction have been also related in the Clinique of M. Pl. Portal, (vol. I., p. 265, 366.)

F. *Polypi of the ear are so slowly developed*, and produce so little disturbance of the functions in certain subjects, that many patients have them for years before asking to be relieved of them. In February, 1830, I extracted one at the hospital of St. Antoine in an adult man, in whom it had existed for fourteen years. Their extraction in such cases is not unattended with some danger. The tympanum, which has been shut out for a considerable length of time from the action of its appropriate stimulants, would be irritated by their presence if they were removed without caution. It is the same as with an eye which has been operated on for cataract: it must be first kept in darkness and not afterwards be exposed to the light except by imperceptible degrees.

G. *Polypi of the ear sometimes acquire a considerable size*: that

mentioned by Sussius (Gerdv, *Thèse de Concours*, 1833, p. 144,) exceeded the size of the fist. A woman whom I had for some weeks at the hospital of La Charité in 1838, had one which was scarcely less in size. I saw the same thing in a young man in 1837. In a female aged twenty-nine years M. Itard (*Mal. des Oreilles*, t. II., p. 125,) found one which was an inch and a half long; but it is not clear that many of these unusual examples did not belong to the class of sarcomatous fungi, either of the dura mater or neighboring bones. In order to remove a tumor of this description in 1835, in a peasant aged twenty-seven years, I was obliged to slit up the pavillon behind, transversely, then to have recourse to a small knife, curved on its flat side, in order to detach the tumor from the bottom of the cavity of the tympanum; I then saw that the fungus did not stop in its limitations in the ear, and that it would repullulate. The patient having survived, I cannot say if, in this case, the dura mater was in reality the source of the disease.

## ARTICLE II.—INTERNAL EAR.

### § I.—*Perforation of the Membrana Tympani.*

Plemp is the first, I believe, who has maintained that the function of hearing may continue although the membrane of the tympanum has been perforated. The fact he relates in support of his assertion appeared at that time so extraordinary, that Verduc refuses to place confidence in it, while Valsalva, who speaks of experiments made upon animals, also denies its possibility, in spite of the authority of Riolan, sustained upon the example of a deaf mute, who having plunged an ear-picker through it, immediately regained his hearing.

Cheselden went farther; since, says he, the loss of the membrana tympani does not produce deafness, we might perhaps, by perforating it in some persons re-establish the faculty of hearing. Unfortunately his operation was unattended with success in the criminal upon whom he first put this suggestion into practice. Though again pointed out by Portal, and formally recommended by Busson, as a means for evacuating abscesses of the cavity of the tympanum, perforation of the tympanum could not be rescued from oblivion, but by M. A. Cooper, who first practised it successfully as a remedy for deafness in 1800 and 1802. Since made trial of with different results by numerous surgeons, it is again ranked among the useful and systematized operations of the healing art. A small curved trochar is the only instrument that was used by M. Cooper, who in order to avoid touching the malleus and the chorda tympani, properly advises that we should perforate the membrane at its anterior and inferior fourth.

Himly, who pretends to have publicly described this operation in 1797, states that the opening soon closes up when we use the trochar. In order to avoid this inconvenience we may perform it with a punch, which M. Fabrizi, of Modena, (*Journ. des Progrès*, t. VII., p. 153,) has ingeniously simplified. After this remark, the cataract needle preferred by Arnemann, the small square-shaped knife as well as Hey's needle, with which Buchanan proposes to divide the fibres of the membrane transversely, and thus favor the retraction of the lips of

the wound, together with the triangular sound of Paroisse and the concealed kystotome of Fusch, ought to be proscribed, as well as the small stilette armed with a circular shoulder near its point, invented by M. Rust, the knitting needle, which according to Michaelis might equally be adopted, the simple probe of Itard, the needle that Saissy incloses in a small gum-elastic canula, and the kystotome of La Faye, which to myself appears to be more convenient than any other instrument. Finally, it was also with a view of having a permanent opening, that M. Richerand supposed that it would be better to perforate the tympanum by cauterizing the membrane with a crayon of nitrate of silver, and that Zang suggested the idea of leaving a catgut in the wound.

To the three successful cases of A. Cooper, we must now add a great number of others. Those of Ansiaux, (*Clin. Chir.*, p. 260, 2nd edit.,) and of Sanders for example, who has cured a deafness of three years' standing by means of this operation; another of Paroisse, in a patient who had been deaf for eight years; those of Michaelis, M. Rust, Itard, Saissy, Maunoir, and Herhold, which latter states that he succeeded in two cases out of three; and those of M. Fabrizi, who informs me he has cured in more than ten instances; but we must not however dissemble that most of those practitioners, as Celliez and Itard among others, and Dubois, in four different trials, have also performed it without deriving the slightest benefit from it. Trury and Kauerz have not been, I believe, any more successful. It is moreover applicable, but in a very small number of cases. We should be wrong therefore to expect any benefit from it when the cause of the deafness is found to be a lesion of the labyrinth, or of the middle portion of the ear, or of the nerves or small bones, or of their muscles; in a word, wherever the disease does not consist merely and simply in the obliteration of the Eustachian tube, or in a thickening or any degenerescence whatever, of the membrane of the tympanum itself. Its object in fact, is to admit the air to enter into the cavity of the tympanum and the mastoid cells. Pus, serosity, mucosities, and other liquid matters, of which it might also favor the egress, would not require this operation unless there should not exist the more natural route through the pharynx. Moreover, it is not dangerous, nor does it give rise to very serious accidents. Being attended with scarcely any pain, and rarely followed by a general reaction, there is no objection to making trial of it when we have no longer any thing to hope for from other remedies; only that we must not promise ourselves too favorable results, or build too sanguine hopes upon it. The simple puncture moreover is of no service. The aperture often closes upon the following day. Excision itself, when a proper instrument has not been at command, is not free from this inconvenience. M. Deleau's punch, which is a kind of concealed spring which slackens at the pleasure of the operator, and which suddenly pushes against each other two small circles with sharp cutting edges, in such manner as to detach a perfect disc from the tympanum, though one of the most perfect instruments, is still far however from being always attended with success. There is scarcely any instrumental apparatus than that of M. Fabrizzi, which will in this respect fulfil every indication.

*§ II.—Perforation of the Mastoid Cells.*

A. When, in consequence of inflammations that are acute or even chronic, severe, dull, or tensive pains are found to exist in the ear,—when we have strong reason for believing that an abscess has formed in this part,—that injections into the cavity of the tympanum would be advantageous, or that there are some carious bones or splinters to be removed, perforation of the mastoid process appears to be very clearly indicated. The passage in which Galen says that where ulcers of the auditory canal have altered the hard parts, we must make an incision behind the ear and rasp the bones or remove their splinters, is all that we find in the ancients that appears to have reference to this subject. But Valsalva had already made the remark that injections forced into the mastoid cells come out by the mouth. Riolan and Rolfinck expressly mention trephining the mastoid process. Heuermann, who saw an abscess of the ear make its exit in that part, and leave a fistula there, concluded therefore, like Duverney in speaking of the surgeon Deymier, that the best thing to be done in such cases would be to apply the crown of a trephine behind the concha, without giving time for the pus to make too profound an alteration in the spongy texture of the process. A patient who would not submit to this operation, recommended by J. L. Petit, died, while by means of it the same author cured a certain number of other patients who were at least as severely affected. Observations of the same kind have been published by Morand, Leschevin, J. Frank, Martin, &c. It is principally upon these that Jasser justified himself in operating upon the soldier, in whom he opened the mastoid process on one side, containing an abscess with caries, and that of the other side in consequence of a simple deafness. Fiedlitz has performed this perforation successfully on both sides in a woman, who had been rendered deaf by a quartan fever. The same author, as quoted by Richter, relates two other cases not less remarkable. Laefler, who eulogizes it greatly, recommends that we should make use of a perforating trephine, armed with a border, which prevents it from penetrating too deep; that we should incise the soft parts twenty-four hours before perforating the bone, in order to have no blood effused into the mastoid cells; and that finally, we should make use daily of injections into the opening, which is to be kept open and dilated by means of a leaden sound. Hagstroem, who however has had no reason to be satisfied with this operation, enters into many more details upon the mode of performing it than Laefler, whose ideas he for the most part adopts. If there already exists a fistula, he says we should confine ourselves to enlarging it. Otherwise we lay bare the bone while avoiding the auricular artery, which is naturally nearer to the concha; after which we have nothing more to do than to perforate the process from behind forwards, by means of a drill, a punch, or a trochar, rather than with a perforator. Acrel considers trephining the ear useless when the bones are sound, and Murray has very properly observed that before the age of puberty, as the mastoid cells are scarcely then developed, it could in reality then be attended with no advantage. The case of Dr. Berger, who died after having been operated upon by Koelpin, and in

whom no cells were found, proves that they may be wanting also in some adults. Similar facts related by Morgagni, however, did not deter either Proet or Arnemann, who assure us that they have had recourse to it with success. Hydropsy of the cavity of the tympanum and simple abscesses do not absolutely require it. They are evacuated full as well by perforating the membrane of the tympanum, which is infinitely less painful and less severe. It is only after all in collections of pus, accompanied with necrosis or caries, and which have a tendency to open behind the ear, that we are to some extent obliged to have recourse to it. In a case of this description, M. Weber, who found the mastoid process sound, after having trephined it, nevertheless cured his patient. M. Denonvilliers, (*Thèse d'agrégat.*, &c., 1839, p. 72,) in analyzing fourteen of these operations on nine patients, found nine cases of cure, two of amelioration, three failures, and one death.

B. *Operative Process.*—A crucial or T incision lays bare the whole outer surface of the mastoid process; we then apply to it either a perforator, or a small crown of the trephine, a drill or a trochar. We take care to slightly incline the instrument forwards and upwards in proportion as it penetrates. As soon as it arrives at the auditory cells we withdraw it, in order to enlarge the opening, if it is necessary, before we stop. Injections are then forced into it with caution. Tents, or rolls of lint, or a leaden sound, should be placed daily in the perforation until the cavity of the tympanum is restored to its natural state. The chisel, gouge and mallet, which were used by J. L. Petit, Chopart and Desault, ought to have the preference, if the bone should be extensively necrosed and it were necessary to remove from it large sized fragments. Should nothing beforehand indicate where the instrument ought to be applied, it should be inserted at six or eight lines above the point of the process. The largest cells correspond to this part. The auricular artery, which is found in front, and the submastoid artery, which is below, may be easily avoided.

### § III.—*Catheterism of the Eustachian Tube.*

A. The idea of penetrating into the cavity of the tympanum through the pharynx, is one that is already very ancient. Archigenes, Valsalva, Munnicks and Busson no doubt had this in their minds when they recommended to inhale vapors of water, tobacco, or other substances, and to forcibly close the nose as well as the mouth, in order to force them to pass towards the ear during expiration. In the year 1724 Guyot, maitre de poste at Versailles, and Cleland in 1741, each devised an instrument for injecting the Eustachian tubes, the one by the mouth, the other through the nose. The sound of A. Petit, which is slightly curved, rendered the operation still more easy. Douglas and Wathen pronounced in favor of the process of Cleland. Heuermann and Ten Haaf adopting that of Guyot, introduced through the mouth into the Eustachian tube a female catheter above the velum palati, and afterwards screwed a small syringe to the other extremity of this instrument. Again recommended by Falkenberg, Sims, Chopart and Desault, and by Callisen, who sometimes performs it through the nose and sometimes through

the mouth, and describes its steps very accurately, and by Buchanan, Itard, Boyer, Richerand, &c.; and proscribed as inapplicable to living man by B. Bell, and by Trempel as dangerous; these injections have again been brought into repute and warmly extolled by M. Deleau. As a mechanical means they enable us to clear out the tubes; and as a medical remedy they act with efficacy on inflammations and engorgements of every description, and on inspissated matters and collections of liquids in the cavity and guttural duct of the tympanum. It may be conceived then how important they would be in deafness, which depends upon one of these causes.

B. There is no doubt that we may penetrate into the tube through the mouth by means of a curved sound above, behind and upon one of the sides of the velum palati, as was done by Heuermann; but the operation being still more easy and especially more certain through the *nasal fossæ*, it is this route which, at the present day, is generally preferred. *Saissy's instrument*, *Itard's* sound in the shape of an Italic S, or a catheter, which differs from a female one in this only, that being open at its two extremities, it has no apertures upon its sides, are with a small syringe to force in the liquids, all that are required for such an operation. A gum-elastic catheter provided with its stilette and properly curved; or a blunt-pointed probe in case it were requisite to overcome the obstructions with a solid instrument, might in a case of necessity be substituted for the other catheters. The surgeon being placed on the side and in front of the patient, reverses the head with one hand, seizes with the other a catheter besmeared with some unctuous matter, presents its beak at the orifice of the nose and causes it to slide along upon the floor of the nasal fossæ at the lower part of the meatus, taking care to keep the convexity of the instrument turned towards the side of the septum and slightly inclined upwards. Having arrived at the upper side of the velum, he slightly elevates the extremity of the instrument without permitting it to leave the external wall of the nostril, which obliges it gradually to reach the upper part of the maxillary meatus; continues to push it in this direction, and inevitably falls into the pavillon of the tube, which from that point runs obliquely outwards, backwards and upwards. As soon as the catheter has entered sufficiently far, the syringe is adapted to its outer extremity, as when we wish to inject in hydrocele, after which any person may comprehend what remains to be done. The operation is repeated once or twice daily, and nothing prevents us, as is perceived, from injecting in this manner into the middle part of the ear whatever medicated liquid we may think proper. Should the injection have stopped in the tube and be prevented by any means from advancing farther, we should in this case remove the syringe and introduce a blunt-pointed probe up to the point where the difficulty is, in order to perforate or destroy it. It must be well understood here that force must not be used but with a great deal of caution, and that before having recourse to it we should make ourselves certain that it has become indispensable and that better directed manipulations might not render it unnecessary.

C. M. Deleau, perceiving that the point of the metallic catheter cannot escape from immediately butting against the walls of the tube, as soon as we desire to advance it a few lines, that its inflexibility

creates pain, and that aqueous injections do not penetrate in this manner into the auricular cavity but with considerable difficulty, has proposed to substitute for it a flexible catheter, and to have recourse to the douches of atmospheric air already recommended a long time since by Herhold, (*L'Experience*, t. I., p. 518.) By the processes of this surgeon the operation becomes practicable at every age. I have seen at his residence two young boys, one four years of age, the other seven, accommodate themselves in the readiest way that could be desired to the manipulations of his method, without evincing the slightest indication of pain. By means of a silver stilette four to six inches long, having quite a strong curvature near its extremity, and a ring on the other extremity, and the diameter of which instrument varies from half a line to a line and a half, he conducts a gum-elastic catheter into the tube. The patient being seated upon a chair, holds his head slightly reversed either against the back of the chair or against a cushion for this purpose, which supported upon an upright may be elevated or depressed at pleasure. The operator, armed with the instrument, which has been previously oiled, presents it at the nostril while holding it in his right hand, like a writing pen, with the concavity turned downwards and outwards. Causing it to penetrate rapidly while following the floor of this cavity, he soon reaches the velum palati, (which is indicated to him by an involuntary movement of deglutition, and the extent of two inches or two inches and a half, at which he has entered,) and immediately elevates the beak outwardly and upward by a circular or rotatory movement, in order to enter into the tube. Seizing with the thumb and forefinger of the left hand the free extremity of the catheter above, he endeavors, if it has stopped, to make it advance, while the stilette is kept immovable by means of his right hand; proceeds in this manner till he reaches the obstacle, which he overcomes in the same manner that we would a contraction of the urethra, and withdraws the directing stilette as soon as he thinks he has entered sufficiently far. A silver pavillon is immediately screwed upon the external opening of the canula, which the surgeon keeps in its place by means of a metallic wire which is passed around it in the manner of a forceps, and which embraces at the same time the ala of the nose. Adapting to this pavillon the beak of a syringe, or bottle, or ball of caoutchouc, he uses this to force the air beyond the obstruction, not exceeding a degree of pressure which habit alone can enable him to estimate. By applying our ear to that of the patient, we perceive whether the cavity of the tympanum is sound or altered, empty or full, and whether the air which we have forced into it can or cannot come out from it between the catheter and walls of the tube. Substituting for the syringe the pipe of a reservoir provided with a manometer, and in which a pump does the duty of compressing the air, and then opening the faucet of this apparatus, we establish in this manner a double atmospheric current in the ear, one which enters by the catheter, and the other which issues out between it and the guttural duct; the operator, who has the power to augment or diminish the force of this douche, intermits it at the expiration of one or several minutes.

D. In order to penetrate through the other nostril, the instrument is to be a little more curved, with its beak slightly reversed in the

direction of its convexity. Being held in the same hand, with the concavity turned downwards and inwards, it is made to pass along the inferior border of the septum. Having arrived at the velum palati, the hand is elevated and carried outwards to incline the extremity of the instrument behind the vomer, that it may reach the tube. The rest of the process is performed as in the preceding one. In both cases, if the catheter is not properly in its place, the patient himself notices it when he has once undergone the operation.

Its direction and the manner in which it is maintained, moreover, sufficiently point it out to the surgeon. He possesses however a ready means of satisfying himself with certainty. Having withdrawn the stilette, we have nothing to do but to force in the air or liquid by the canula. The injection will fall into the pharynx if the position is false, and will not penetrate, or, in the contrary case, will enter into the cavity of the tympanum. If after having overcome the obstruction, the air produces in the cavity *a pattering sound (bruit de pluie)* upon the membrane of the tympanum, or a rough sound (*bruit sec*), we conclude from this that the middle part of the ear is not altered; if it seems rather to agitate a liquid, and if the sound is *mucose, (muqueux,)* we are then authorized in believing in the existence of pus, blood, serosity or at least an engorgement of the internal membrane of the middle ear.

In both cases, if the tube is evidently choked up or narrowed, and that the patient perceives sounds better immediately after than before the catheterism, the deafness is imputable to the condition of the tube and there is every reason to believe that it may be cured. When there results no change from it, the disease is very probably elsewhere, and we may be almost certain that this operation will be of no advantage afterwards. If acute pain be produced by the injection, it indicates an acute phlegmasia or too great a degree of nervous irritability, which are to be treated by means of the usual remedies. In simple obstruction or phlegmasias that are purely chronic, the suffering is almost nothing either during or after the operation. M. Deleau explains the action of the air in a manner which is altogether mechanical. It ventilates, fumigates and washes out gradually the cavity of the tympanum and the mastoid cells. In returning between the catheter and the tube, it necessarily makes an effort, and becomes a dilating and resolvent body by the compression which it exercises upon the engorged tissues. Water and liquids are much more liable to wound and lacerate the membrana tympani, &c., and do not produce medical effects different from gases. Any intelligent person may understand after all that every case must require particular modifications, and that in respect to the operative manual it is the same with contractions of the Eustachian tube as with the coarcations of the urethra; and that on this point, address and trials often repeated, joined to much prudence, will be alone enabled to give sufficient degree of dexterity to the person who would desire to employ with advantage catheterism of the guttural duct of the auditory apparatus.

E. The sounds, catheters and probes devised by *M. Gairal,* (*Journ. Hebdom., 1836, t. II., pp. 97, 129, 197,*) who provides them with a leather bottle and faucet (*une outre à robinet*), and of gum

elastic, in order to inject the Eustachian tube, render the operation still more easy and perfect.

F. One doubt remains for me to express: the engorgement, thickening, and inflamed condition of the mucous membrane of the tube being admitted as a cause of deafness, would it not be allowable to make use, against these affections, of the treatment which is advantageously employed for their radical cure in the urethra, to wit: cauterization with nitrate of silver? Having made no trial in support of this suggestion, I merely recur to it, en passant, and am not unaware of the apprehension that ought naturally to be inspired by the introduction of caustics into the ear through the pharynx.

I will add that the attempts made by different persons since the first edition of this work, have not yet produced any very satisfactory result, and that the excision of the tonsils is likewise a valuable means in the cure of this description of deafness.

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## PART SECOND.

### OPERATIONS WHICH ARE PERFORMED UPON THE NECK.

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#### CHAPTER I.

##### TUMORS OF THE SALIVARY REGIONS.

###### ARTICLE I.—THE PAROTID, AND PAROTID TUMORS.

###### § I.—*Examination of Facts.*

Should we take literally what authors of the last century have said of it, nothing could be more simple than the total eradication of the parotid gland. In our times, on the contrary, nothing seems to be more uncommon, so much so that numerous distinguished surgeons, Boyer among others, deny even its possibility.

It is true that most of the cases which have been related are far from being conclusive. Thus, as Richter had already remarked and as Burns has demonstrated, the assertions of Heister, who says he had often extirpated the parotid; those of Scultetus, Verdier, Palfin, V. Swieten, Gooch, Berh, Roonhuysen, Gottefried, Errhart, &c., and of Garengeot, who pretends that this operation scarcely ever causes any hemorrhage; of Scharschmidt, who considers that he has performed it a great number of times with success, among others, upon a patient in whom the tumor weighed three pounds; of Acrel, who was enabled to arrest the hemorrhage by means of simple tamponing; of Burgraw and Hezel, and of Alix, who was enabled to extirpate a mass of four pounds in weight below the ear, without producing the slightest effusion of blood; of K. Boerhaave, and some others still, evidently refer to the ablation of lymphatic tumors developed in the depth of the parotid space, or to cysts either salivary,

as in the case of M. Krimer, (*Bull. de Févr.*, t. XVI., p. 72,) or purely serous, as in the patient of M. Henri, (*Bull. de l'Acad. Roy. de Méd.*, t. I., p. 56,) and not to the parotid itself. M. Smith, (*Gaz. Med.*, 1839, p. 43,) who considers that he extirpated the parotid, in removing from the parotid depression a tumor of the size of a nut, and who divided the facial nerve, took away probably only a degenerate lymphatic mass. The tumor of the size of an orange, successfully extirpated by M. Goyrand, (*Savournin, Lancette Franc.*, 1839, t. I., p. 14,) from the parotid region, was not the gland. In another case the same surgeon, (*Lancette Franc.*, 1839, t. I., p. 14,) removed a part of the parotid gland, and the submaxillary gland, together with degenerated lymphatic ganglions. The patient got well without any unpleasant consequences. It would be doubtless difficult to say whether the tumor successfully removed from the parotid region by M. Pl. Portal, (*Clin. Chir.*, vol. I., p. 125,) was rather of an encephaloid than lymphatic nature; but certainly it was not the gland itself. In 1781, J. B. Siebold supposed that he had removed the parotid entire, because after the operation it could be readily seen that the digastric and stylo-hyoid muscles, as well as the carotid artery, were laid bare. In a student mentioned by Heister, it became necessary to go so deep, that the carotid gave rise to a fatal hemorrhage. Soucramp, supposing that he was about to remove a loupe, discovered that he had extirpated the parotid. There was much less blood discharged than the surgeon expected, and the patient was perfectly restored. In 1796, Ch. G. Siebold, who removed an enormous tumor from the side of the neck in a young girl, states that the cavity thereby made was so deep that all the assistants were obliged to admit that the parotid had been extracted from it entire. In the patient operated upon by Klein (*Graefe und Walther's Journ.*, vol. I., p. 106) in 1820, the facial nerve was divided. The cure was accomplished at the expiration of eighteen days. In the case of M. Idrac, there was no artery requiring a ligature; but the wound presented the same aspect as in the patient of Siebold the father. The case recovered without being followed by paralysis. The case of M. Lacoste differs from that of M. Idrac in this only, that there was an abundant hemorrhage, which was twice renewed, and placed the life of the patient in jeopardy. One of the tumors removed by M. Prieger, (*Ibid.*, vol. III., p. 455,) weighed nearly three pounds. The carotid was avoided and the woman survived. If we may believe M. Kirby, he was enabled to satisfy himself, after his operation, that the interval between the pterygoid muscles was void, and the auditory passage laid bare, as well as the temporo-maxillary articulation, and the whole length of the styloid process. Nevertheless, tamponing with sponges succeeded in arresting the hemorrhage, and notwithstanding an erysipelas which appeared on the face, the patient recovered. As to the fact related by M. Pamard, the author himself admits that the parotid was not extirpated in its totality. M. Nægèle, on his part, alleges that we may remove this gland in the dead body without wounding the facial nerve, and maintains that he performed it with success without producing paralysis. M. Moulinié, (*Bull. Méd. de Bordeaux*, 1833,) having cauterized after having excised or extirpated the tumor, lost one of his patients and cured the other. In a pa-

tient whom I have seen and who was first successfully operated on by M. L'Herminier of Guadalupe, the cancer reappeared and caused death. Goodlad furnishes a case which is sufficiently well detailed, of extirpation of the parotid; it is to Béclard, however, that we are indebted for the first demonstration of this fact. His patient, who was operated upon in 1823, had all the muscles upon one side of his face paralyzed, and as he died some months subsequently, they were enabled to ascertain that the whole gland had been actually extirpated. A patient operated upon in September, 1824, by M. Gensoul, and who died in the course of the year 1825, also furnished the proof that the parotid had been thoroughly extirpated. M. Gensoul, still more fortunate than in his first case, repeated this operation in 1826 with entire success; but the patient remained paralyzed on one half of his face. M. Carmichael had been equally fortunate some time before, that is to say in 1818, and mentions the same peculiarity as M. Gensoul as the consequence of the operation.

In 1826, also, M. Lisfranc had occasion to remove the parotid, and ascertained, after death, that scarcely anything of the gland remained in the parotid space. M. Mott, (*Arch. Gén. de Méd.*, t. XXX., p. 419,) who previously tied the carotid, also considers that he extirpated the whole gland in a patient, who died at the expiration of seven weeks. M. Roux (*Ibid.*, 2e série, t. VII., p. 404,) and M. Chelius (*Ibid.*, 2e série, t. IX., pp. 230, 265,) in performing the same operation did not find it necessary to tie the carotid artery. In the operation performed by M. Heyfelder, (*Graefe und Walther's Journ.*, vol. X., p. 575,) in the month of June, 1825, the patient lost but three or four ounces of blood, a small lobe of the gland only was left in front, and the paralysis of the face ultimately disappeared spontaneously. In the patient operated upon by M. MacLellan in 1826, the cure was complete, says the author, though the gland had been entirely removed. That of M. Cordes, (*Journ. de Walther, &c.*, vol. II., p. 105,) who states that he did not leave the least particle of the gland, also perfectly recovered. M. Bernt (*Bull. de Fér.*, t. III., p. 287,) also alleges that he has performed this extirpation with success. The Archives (*Arch. Gén. de Méd.*, t. IV., p. 64,) contain another example, in which layer after layer was removed down to the carotid. In the operation which M. A. Fonthein (*Graefe und Walther's Journ.*, vol. XIII., p. 290,) performed in the month of November, 1828, the carotid was not wounded, no hemorrhage supervened, and the cure was completed on the thirtieth day. The paralysis itself, which took place at first as in the preceding cases, completely disappeared. In the month of January, 1829, M. A. Magri (*Bull. de Fér.*, t. XXII., p. 84, and *Journ. des Progrès*, 2e sér., t. I., p. 261,) extirpated on the side of the neck a tumor which included the whole of the parotid, and was enabled to dispense with a ligature on the trunk of the carotid. The patient was restored in the space of twenty-six days, with the exception, however, of the facial paralysis which remained. M. Dugied, who gives an extract from most of these cases, and which are mentioned also by MM. Hourman and Pillet in their dissertation, also states that MM. A. Cooper and Weinhold have repeatedly extirpated the parotid entire. But I have not been able to ascertain where these

observations have been published, with the exception of those of M. Weinhold, (*Bull. de Fér.*, t. VI., p. 242,) who has preserved one of these glands in his museum and shows it to those who wish to see it. To the examples above mentioned it would be necessary at the present time to add the following :

- 1st. Man, forty-six years of age ; extirpation without previous ligature ; no serious hemorrhage ; cure ; palsy of the face ; (Hendriks.)  
2nd. Woman, nineteen years of age ; extirpation without previous ligature ; cure ; palsy of the face ; (Hendriks.) 3d. Woman, thirty-eight years of age ; extirpation without previous ligature ; cure ; (Hendriks.) 4th. Woman, thirty-three years of age ; extirpation and cauterization ; cure ; (Hendriks.)—(Baamberg, *Dissert. sur l'Extirp. de la Parot.*) 5th. A woman ; size of a goose egg ; extirpation ; cure ; (Eulenberg;) (*Journ. des Conn. Méd-Chir.*, t. III., p. 75.) 6th. Another ; enormous ; previous ligature of the carotid ; (Stedmann;) (*Gaz. Méd.*, 1832, p. 529.) 7th. Another ; prolonging itself upon the jaw ; ligature of the carotid ; cure ; (Awll;) (*Western and Physic. Journ.*, vol. I., p. 423.) 8th. Another ; (Eckström;) (*Bull. de Fér.*, t. VIII., p. 204.) 9th. Another ; boy, aged fifteen years ; ligature upon the external carotid ; apprehension of a return. 10th. Another ; extirpation incomplete ; (Ansiaux;) (*Clin. Chir.*, p. 233, 2d edit.) 11th. Another ; extirpation without previous ligature, and cure ; (Warren, the father.) 12th. Another ; the carotid wounded and tied ; fistula and paralysis ; (Warren, the son;) (*On Tumors, &c.* p. 280.) 13th. A woman ; thirty-four years of age ; on the right side, and weighed twenty-one ounces ; performed 26th May ; cured, 14th July, 1838 ; (MacGregor;) (*Lancet*, June, 1838, p. 498.) 14th. Another ; the jugular [wounded] and external carotid tied ; cured ; (Widmer;) (*L'Expérience*, t. II., p. 336.)

II. *Appreciation of the Facts.*—The question whether we may or may not extirpate the parotid gland in its totality, appears to me to have been incorrectly stated. The salivary glands, including with them the parotid, scarcely ever degenerate. The tumors that have been removed under their name almost all belong to other tissues and to other organs. Even in the substance of the parotid itself there are a great number of lymphatic ganglions. These ganglions when they swell become fungous, tuberculous, and cancerous, and are transformed into bosselated tumors, which spread out, flatten, and disorganize the glandular tissue, and lead to misconceptions of the real character of the parts which are extirpated. I have performed extirpations of this kind at least twenty times, to such extent as to lay bare the whole parotid cavity, and to be afterwards under the necessity of submitting the tumor to a careful dissection, in order to satisfy myself that the ganglions, rather than the glands, had been the source of the disease. I have, moreover, encountered in this region meliceromatous, lipomatous, fibrous, melanotic, encephaloid, and other tumors. A new-born infant that M. P. Dubois showed me, in Jan., 1839, had in this part an erectile venous tumor of five inches in diameter. Not wishing to treat in this place except of tumors which implicate the parotid, whether they originate or not from its tissue, I refer to the chapter on tumors in general for those of other descriptions.

### § III.—*Anatomical Remarks.*

The parotid, enveloped in its aponeurosis, continuous in some respects with the sub-maxillary gland, as it passes upon the internal side of the angle of the jaw, united superiorly in quite a firm manner to the auditory passage and behind to the mastoid process and sterno-mastoid muscle, is prolonged in front upon the external surface of the masseter. On its anterior surface it covers or includes among its lobes from above downwards and from without inwards ;—1st, the transverse facial artery and the two principal branches of the facial nerve at the point where they pass upon the border of the jaw ; 2d, parallel to this border the superficial temporal artery and vein ; 3d, the external carotid and the origin of the internal maxillary artery ; and 4th, the pterygoid muscles and some branches of the pharyngeal vessels. Inferiorly it rests against the stylo-maxillary ligament and the digastric and stylo-hyoïd muscles ; posteriorly between the ear and mastoid process against the auricular artery ; and deeper still upon the stylo-mastoid artery. At its apex it reaches nearly to the internal jugular vein, and the great hypo-glossus, pneumo-gastric, and great sympathetic nerves, between the transverse process of the first vertebræ and the pharynx. One of its branches is almost always prolonged between the two carotids. Another frequently reaches between the stylo-glossus and stylopharyngeal muscles, the internal carotid artery and the jugular vein. All of them cover the styloid process, which they embrace, and the root of the anatomical bouquet of Riolan. Finally, it is traversed obliquely from above downwards, from within outwards, and from behind forwards, by the trunk of the facial nerve, which bifurcates in its substance, where is encountered also the vein which makes the communication between the two jugulars, some very small lymphatic ganglions, and other arterial and venous branches much less important.

### § IV.—*Operative Process.*

When the operation is decided upon, the first question which presents itself, is this : should we or should we not imitate Goodlad, who was among the first that tied, as a preliminary step, the carotid artery ? In the beginning we never can know whether we shall be under the necessity of removing the gland in its totality. Though the wounding of the external carotid is almost inevitable, the internal carotid may in a great many instances be respected. In making up our minds to surround the trunk only with a thread during the progress of the operation, as was done or appears to have been done by Béclard and MM. Carmichael, Gensoul and Lisfranc, we have, if it is practicable, the chance at least of dispensing with the ligature, and without exposing ourselves on that account to the encounter of more serious difficulties than by any other process. The surgeon finding that the glandular tissue instead of having produced the disease has merely become the receptacle of it, endeavors to remove the gland only in the manner of cellular tissue, which surrounds or is in the vicinity of any tumor whatever ; it is to the lymphatic or cancerous tumor, and their branches wherever they may be, that he directs his attention, in place of following out the pro-

longations of the parotid gland. Setting out upon this principle, I have never been under the necessity of tying the carotid vessels beforehand, though I had penetrated down to the bottom of the parotid cavity.

A. *Extirpation.*—The instruments that we may require for extirpating parotid tumors, are composed of a straight, convex, and blunt-pointed bistoury, straight and curved scissors, a dissecting forceps, a canulated sound without any cul de sac, a scalpel, the flattened handle of which may serve to separate the parts, should occasion require, needles armed with ligatures, and whatever it would be requisite to have at hand, if we were obliged to place a ligature upon the carotid artery. The rest of the articles consists of sponges, small balls and plumasseau of lint, agaric, long and square compresses, one or two bandages, and other articles which are required in all great operations.

I. *First stage.*—The patient being placed upon his sound side and held by assistants, is to be fixed in such manner as to be enabled to breathe and spit freely. One of the assistants should hold himself ready to compress the trunk of the primitive carotid in case of accident. The size and form of the tumor, and condition of the integuments, determine the kind of incision which is to be first made. If the skin is sound and free from adhesion, if the body to be removed does not exceed the dimensions of a pullet's egg, the crucial or T incision might be replaced by the semilunar, to which for myself I give the preference. Otherwise we must have recourse to the elliptic incision, in order to remove with the tumor a flap of cutaneous tissue of greater or lesser extent. In this last case nothing prevents us from making afterwards upon each lip of the ellipse another incision, which transforms it into a legitimate T, and which after the operation will reduce the whole to a crucial incision. Unless the disease should have extended to a great distance towards the mouth, there can be no doubt that there is less advantage in placing the great diameter of the wound transversely, as Goodlad did, and M. Fonthein advises, than from above downwards. These are the only general rules that are required to be laid down on this first point. It is upon himself and upon his personal knowledge and skill that the operator will be obliged to rely, in order to follow them out, or to modify or restrain them.

II. *Second stage.*—The integuments having been dissected, and the flaps reversed, the surgeon detaches the altered mass by commencing at its superior part, then going to its posterior border, in order that he may not at the beginning fall upon the carotid; he ties the arteries in proportion as they are opened, or if they are of little size confines himself to their compression by the finger of an assistant, and takes care when he reaches towards the border of the jaw or near the pterygoid muscles, to hold the cutting edge of his bistoury rather turned backwards than forwards, and directed rather against the tissues to be extirpated, than towards those which are to be preserved. The handle of the scalpel ought to be preferred so long as it appears to answer. By means of this instrument we detach or isolate the most of the lobes of the gland or tumor, disengage them from among the vessels without incurring the risk of opening the

arteries, and thereby diminish to the same extent the danger of the operation. When, however, we are satisfied that the adhesions to be destroyed do not include any part which it is important to preserve, the bistoury should be substituted for the scalpel. By tearing out the lobes the dissection is more safe; by incision it is less painful, and more favorable for the subsequent symptoms.

III. *Third stage.*—Having arrived behind the maxillary branch, the operator should double his precautions. There are to be found the external carotid and the origin of the temporal and internal maxillary arteries. Deeper still at the top of the parotid fossa, should there exist some pedicle or prolongation, which cannot be detached by the handle of the instrument, prudence suggests that we should apply the ligature to them on the side towards the sound parts, before excising them. On the supposition, that during all these manipulations a large artery, the external carotid for example, has been opened into, or that we perceive that its lesion is inevitable, we ought, before going any farther, to lay it bare near its root, in order that we may apply the ligature to it sufficiently low down not to incur the risk of wounding it afterwards. Should not the muscles of the styloid process, nor especially the digastric be degenerated, we should do all in our power to avoid destroying them. Under opposite circumstances we should sacrifice them without any hesitation, as well as the trunk of the facial nerve, which it is useless to attempt to save when the whole parotid is disorganized. Finally, it may be possible that the tumor no longer resists except at its summit, and that in spite of the tractions made upon it by the left hand on the one part, and by the handle of the scalpel on the other, this point adheres firmly to the bottom of the wound. In this case, from the apprehension that it may include some large vascular trunk, it is better to embrace it with a ligature, strangulate it in the same way that we would a polypus, in conforming to the advice of Hezel, and to restrict ourselves for the time being, to the excision of that portion of the tumor only, which remains perfectly free. M. Bégin, (*Elem. de Pathol.*, &c., t. I., 2d edit., p. 204,) from having on one occasion neglected to adopt this precaution, found a volume of arterial spouting from the wound, which gave him so much the greater uneasiness, from the retracted end of the vessel having escaped from the ligatures, and from the necessity to which he was compelled of having recourse to a methodical, severe and painful compression.

IV. *Fourth stage.*—The arteries which may have been wounded are, besides the carotid, the transverse facial, temporal, auricular, mastoid, stylo-mastoid, occipital, internal maxillary, the inferior pharyngeal, and even the lingual and facial. All these branches therefore are to be successively tied, if we have not performed this operation upon their common trunk at first. The blood which continues to flow afterwards can come only from veins, and requires, if it does not stop of itself, no other means than tamponing. At the first aspect the excavation which has been produced has something frightful in its appearance; but its depth alone would not prove that we had in reality extirpated the parotid rather than the lymphatic ganglions. If the wound should only be some inches in extent, its flaps could be approximated and united either by strips of adhesive plaster or the

suture. But when it is very large, if we attempt immediate and complete union, we incur the risk of purulent collections, and simple or phlegmonous erysipelas, and all their consequences, as we have seen in the cases ascribed to Béclard and many others. After the cicatrization the patient may remain feeble, which he should be apprized of. The movements of the pharynx, larynx, tongue, and even the jaw, sometimes suffer much from this operation, owing to the muscles which have been divided. More frequently still, the section of the facial nerve more or less completely paralyzes the eyelids, ala of the nose, the labial angle, or all the corresponding half of the face.

B. *Ligature*.—The cutting instrument is not the only remedy that has been suggested to practitioners for the removal of parotid tumors. Roonhuysen, who, deterred by the dangers of hemorrhage, had already proposed to substitute the ligature for it, introduced a double ligature deep down through the base of the tumor, and afterwards tied its two extremities separately, the one above, the other below, in such manner as to produce mortification of the diseased tissues. M. Mayor recommends that we should first lay it bare as in extirpating it, and that after having isolated all that portion of it which projects externally, we should traverse it in the manner of Roonhuysen, or better still, that we should draw it to the outside as much as possible by means of an erigne forceps, and then introduce upon its root a strong ligature, which he tightens by degrees with his chaplet constrictor. In five or six days, says he, the degenerescence is entirely cut through or reduced to putrilage, and no artery has run any risk of being wounded. It was in this manner that he cured a young girl fourteen years of age of a tumor that she had had for three years in front of the ear; also another patient of eighteen, in whom the gland extended from the zygomatic arch to below the angle of the jaw; finally, a third, in whom the morbid mass, eight inches long and four broad, was situated in the parotid region. But whatever the author may say on the subject, these facts relate much more to the extirpation of degenerate lymphatic ganglions than to that of the parotid gland, properly so called. I find, moreover, an inconvenience in this method: it incurs the risk of removing only a part of the disease when it extends deep within, while, if it is superficial, the employment of the bistoury being then less dangerous, the ligature loses much of its importance. Nevertheless I would not object to make trial of it by combining it with dissection in the first of these cases. Without giving ourselves the trouble of tearing out all the branches of the gland successively, when they penetrate too deep into the midst of the vessels, a strong ligature, which would comprehend them *en masse*, and which would enable us to strangulate them by degrees, appears to me to offer a resource which up to the present time, as M. Mayor justly complains, has been too much neglected.

C. *Caustics*.—The recommendation of Desault and Chopart, who proposed, after having excised all the projecting portion of the scirrus, that we should destroy the remainder with a hot iron or caustics, is assuredly a much more objectionable process, and scarcely deserves to be taken into considération. The actual cautery could only be useful in this operation for obliterating the mouths of vessels that had escaped from the ligatures, and for destroying some morbid vestiges,

if there are any, that the instrument has not removed, contrary to the intention of the operator. (See on the subject of cysts or other tumors of the parotid region, and the operations required for them the chapter on *Tumors in general*.)

[CASE OF EXTRIPATION OF THE PAROTID GLAND. By VALENTINE MOTT, M.D., &c. &c. (See *American Journal of the Medical Sciences*, 1832, Vol. X., pp. 17-20.)

J. B., a native of St. Domingo, aged twenty-one years, came under my care in the latter part of June for a tumor situated on the face. He stated that he first observed it in January last, shortly after a severe attack of fever, and that it gradually increased in size until a few months ago, when he became alarmed at its progress, and decided upon visiting this country.

Upon inspection I found a very hard tumor, about the size of an ordinary fist, involving nearly the whole left side of the face, and evidently formed of the parotid gland, apparently in a scirrhouous state. (See Fig. 1.) From its magnitude, and as the only chance left for the



(Fig. 1.)

recovery of my patient, I resolved upon attempting its extirpation, and with his free consent, after rendering the subject perfectly intelligible to him, fixed on the 13th of July for carrying it into effect.

Accordingly, on that day the operation was performed. It was commenced by interrupting the circulation through the external carotid artery by ligature, and for that purpose an incision was made from the posterior angle of the lower jaw downward and inward

about three inches in length, so as to expose to view the inner margin of the sterno-cleido mastoid muscle. An enlarged lymphatic gland was now exposed, lying directly upon the sheath of the vessels. Upon turning it to the inside, the external carotid was laid bare, and tied immediately below the digastric muscle, and a little above the upper border of the thyroid cartilage. From the tumefaction of this part of the neck the artery was nearly three inches from the surface.

An incision was next commenced above the jugum temporale and carried downward in a semicircular direction, until it terminated upon the os occipitis. The incision in the neck was now extended upward, to intersect the one over the tumor.

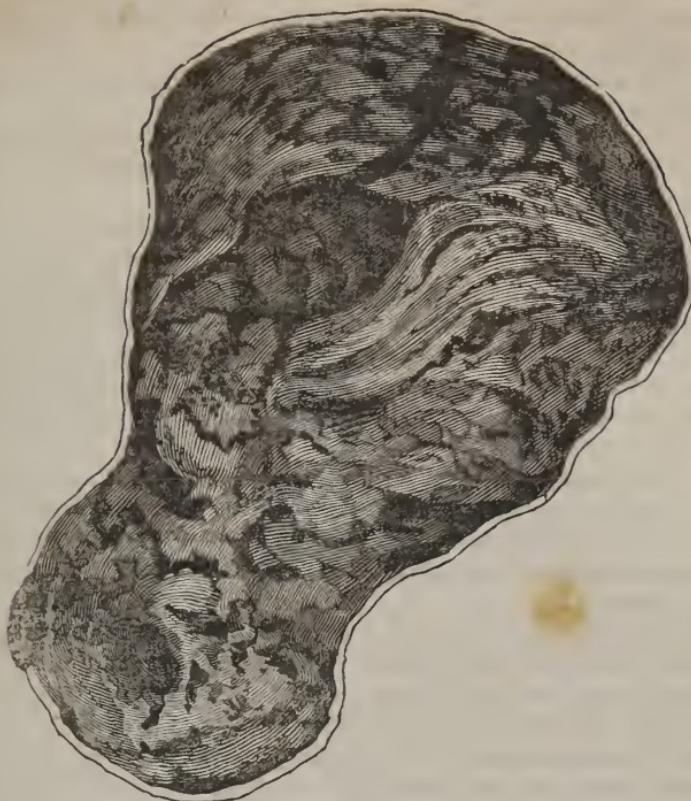
On detaching the integuments in the form of a double flap from over the diseased mass, its black appearance removed the impression of its scirrhouus character, and fully demonstrated a melanotic condition of the gland. I however determined upon continuing the dissection, and proceeded to detach it from its various connexions. With this intention I commenced by dividing along the inner margin of the tumor the adipose and cellular tissue, until the inner edge of the masseter muscle was exposed to view. The finger was now introduced into the mouth, and cut upon in order to avoid dividing its membrane, and after separating the tumor for some distance from the masseter, to which it closely adhered, I detached it from the jugum, which had become more or less carious from pressure. It was next dissected from the mastoid and digastric muscles, and from the posterior angle of the jaw, but as the patient complained of excruciating torture when the tumor was raised from below upward, I determined to continue the dissection from above downward, and accordingly separated it, with a few rapid strokes of the knife, from the capsular ligament of the lower jaw, and removed the bulk of the disease, as represented in Fig. 2, next page. The portion filling up the space between the styloid and mastoid processes was cautiously detached with the handle of a scalpel, and the facial nerve or portio dura divided by a quick movement of the knife. At the instant of the division of this nerve, he seemed to evince more pain than at any period of the operation. The muscles of the left side of the face were paralyzed. All the remaining portions of the disease were, as far as practicable, removed.

Several arteries were tied during the extirpation of the tumor, and after its removal. The trunk of the temporal was cut as it emerged from the disease, and yielded a profuse retrograde hemorrhage.

The operation lasted about an hour, and the patient lost perhaps a pint of blood. In the operation I was assisted by Drs. Vaché, Wilkes, Hosack, and Dykers, and it was performed in the presence of Drs. Barrow, A. Smith, Graham, and Seaman, and about twenty pupils.

After waiting a proper time, to see if any bleeding would occur, and refreshing our patient, although he did not seem exhausted, the wound was closed by several sutures and adhesive straps, and lint, compress, and double-headed roller, completed the dressings.

*Evening.*—Has had a little sleep and feels as well as he expected. No hemorrhage: reaction has come on; took claret and water, with



(Fig. 2.)

toast, which he sat up and ate with a relish, shortly after the operation.

*14th, morning.*—Left two pupils with him during the night, who report that he had slept well, and did not take the morphine that was directed, if he should be restless and in much pain. Pulse 94—skin natural. As he was averse to taking tea or barley-water, from the impression that it would occasion vomiting, he was allowed his favorite drink of weak claret and water.

*Evening.* Has had no evacuation from his bowels; directed the nurse to administer a common enema; pulse 104; skin pleasant; complains of considerable pain in swallowing.

*15th, morning.*—Enema operated favorably. Did not rest well during the night, but in the morning got some refreshing sleep. Skin a little heated; pulse 122.

*Evening.* Says he is more comfortable every way. Skin moist; pulse 108; recommended an enema.

*16th, morning.*—Has had a very undisturbed sleep, and feels better than at any time since the operation. Skin soft; pulse 96. Takes only sugar and water as a drink.

*Evening.* More comfortable than in the morning; has slept considerably during the day. Face more swelled; pulse 100; skin cool and soft; ordered an enema previous to bed-time.

*17th, morning.*—Passed a pretty good night; had a free perspiration. Pulse 98; skin natural.

*Evening.* Feels in all respects better; pulse more frequent than in the morning; skin the same.

18th. Swelling of the face rather diminished; does not complain of any pain in the wound, or in his head; pulse 95.

19th. Some discharge from the lower part of the wound. Dressed it; looks very well. Pulse 88. Ordered chicken water and an enema in the evening.

20th. Says he passed an excellent night, and feels much better. Pulse 96; skin natural; swelling of the face subsiding.

21st. Dressed the wound; discharge very good; pulse 88.

22d and 23d. Dressed the wound; seems improving in all respects.

24th. Removed all the plasters and dressed the entire wound; took away several of the sutures; very much healed by adhesion. Pulse and skin natural; bowels have been moved naturally. Directed more nourishment.

27th. Upon cleansing the wound, ligature from the carotid came away. Removed remaining ligatures and sutures; wound mostly healed; at a small unhealed point, opposite the lobe of the ear, the integuments appear to be taking on the melanotic aspect and a bloody fluid is discharged.

30th. Wound entirely healed, excepting at the point opposite the ear, which has every appearance of a reproduction of the disease. Complains of pain in the left knee, of which he has had several previous attacks. Directed leeches and warm fomentations.

*August 5th.*—Leeches have been repeated, followed by blisters. Pain in the knee less, but tumefaction increased; reunited portion of the wound taking on a melanoid fungous character; a small tumor making its appearance over the right eyebrow. Ordered syrup of sarsaparilla, with a small quantity of mur. hydr. in solution.

12th. Several tumors have made their appearance upon the scalp; fungous of the wound rather increased; a dark spot showing itself in the integuments of the diseased side of the face; tumefaction of the knee increased; complains of pain in the right side. Skin assuming a yellow color.

20th. Tumors all increased in size; hepatic affection very decided; confirmed hectic, and is evidently sinking. Every thing done to make him comfortable.

31st. In all respects worse. Permitted every thing he desires.

*Sept. 5th.*—Died this morning.

After death every exertion was made in order to obtain an examination of the body, but such were the feelings of the friends of the deceased, that even the desire of passing a lancet into one of the tumors on the scalp, with a view of ascertaining their positive character, although I had no doubt of the case being constitutional melanosis, was obstinately refused, and compelled to be abandoned.

On dividing the tumor longitudinally, not a vestige of the original organization of the gland could be observed. The inner surfaces had the appearance of firm tar, and imparted a black color to the fingers when touched. V. MOTT.]

[*Extirpation of the Parotid.*—M. Larrey, in the case of a girl aged nineteen, in whom the chain of lymphatic glands on the left side of the neck became so hypertrophied as to constitute an enormous

tumor in that region, implicating the parotid, (*L'Examinateur Médicale*, Aug. 15, 1841,) first effected a resolution of the ganglia by the actual cautery, moxas, mercurial frictions, &c., which treatment occupied two years, and then removed the parotid, when a perfect cure resulted. T.]

## ARTICLE II.—SUBMAXILLARY GLAND.

### § I.

There is *no conclusive proof* to show that the sub-maxillary gland has ever passed into the state of scirrhus or cancer. The examples which have been brought forward for this relate to the conglobate glands which are in its neighborhood, and which are found between them and the border of the jaw and platysma-myoides muscle. Its induration, in consequence of chronic inflammation, in grenouillette, for example, is far from being as unfrequent.

Abscesses that become developed in the cellular tissue of its neighborhood, and which remain fistulous after being opened, also produce this result. But however obstinate it may be, this malady ordinarily yields to other means than extirpation, which never seems to be absolutely required. Of the observations which have been published in France, the one which I have made known, and which belongs to M. J. Cloquet, is a pure and perfect example of extirpation of the supra-hyoid ganglions; that of M. Amussat comes probably under the same description, and moreover it is far from being demonstrated that in his patient the operation was absolutely necessary. I would say the same of the case related by M. Warren, (*on Tumors, &c.*, p. 129.) It moreover appears to me evident that the tumor of the size of an egg extirpated by M. Sicherer, (*Gaz. Méd.*, 1838, p. 810,) under the title of a maxillary gland, was nothing more than a lymphatic tumor. Was not this the case also with the sub-maxillary cyst removed by M. Malcolmson, and which I have spoken of elsewhere? (see *Salivary Cysts.*) The cases of extirpation of the sub-maxillary and sub-lingual gland mentioned by M. Diday, (*Thèse de Concours*, 1839, p. 59,) being unaccompanied with any detail, are still less conclusive. The tumor of the size of an egg developed under the angle of the jaw in an epileptic, and extirpated by M. Petrunti with much difficulty, the operation causing frightful convulsions for the space of four days, (*Gaz. Méd.*, 1839, p. 122), was, as I conceive, only a lymphatic mass, and not cancerous, as the author supposes. In this case the disease did not repullulate and the epilepsy disappeared. In conclusion, whether the disease be seated in the gland or in the ganglions which surround it, the operation when we have once decided on removing it is nearly the same. The sub-maxillary gland, embraced as it were inferiorly by the concavity of the digastric muscle and separated from the integuments by the facial vein and platysma-myoides muscle, rests superiorly against the inner surface of the jaw, inwardly against the hyoglossus muscle and the mylo-hyoid, upon the external surface of which one of its prolongations extends. The facial artery runs along its upper and inner side. The lingual nerve and the artery of the same name pass below it. Far above, it receives the plexus of the myloid nerve.

### § II.—*Operative Process.*

All that I have said of the form and direction to be given to the incisions, in speaking of the parotid, is equally applicable here. The patient is to have his mouth kept shut, the chin raised up, and the head thrown back and to one side. The gland or tumor is thus fully exposed. In order to reach it, should the semilunar or horizontal incision not appear to answer, the surgeon divides the skin first from above downwards from the border of the jaw as far as to the os hyoides, and afterwards transversely; he then dissects, separates and reverses the flaps thus circumscribed; applies two ligatures upon the facial vein to divide it in the interval, should it interfere too much or cannot be kept out of the way by means of a hook; inserts an erigene into the body of the gland and draws it outwards and upwards, and then backwards and downwards, while he detaches from it, with short cuts of the bistoury, its inferior or anterior half; carefully avoids the lingual artery and its associate nerve; searches posteriorly for the trunk of the external maxillary artery and ties it; brings the erigene forwards and downwards; separates the morbid mass in the direction of the tongue, and then removes it without any difficulty. If we should prefer commencing with a ligature on the maxillary artery, it would be necessary to direct the first incision upon this vessel and to search for it at the point which I have mentioned in another chapter. Nor are we obliged to tie it at all, if we take the precaution to preserve intact up to the end of the operation that part of it at which its branches enter into the gland, and to embrace it as a pedicle by means of a strong ligature. For the dressing and subsequent treatment we proceed in the same manner as after the extirpation of the parotid, bearing in mind, however, that below the jaw union by the first intention has infinitely less danger, and that the totality of the operation is incomparably less formidable than in the sub-auricular notch. I have elsewhere treated in detail of this operation, while speaking of lymphatic sub-maxillary and *supra-hyoid tumors.*

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## CHAPTER II.

### TUMORS OF THE SUB-HYOID REGION.

#### ARTICLE I.—THE THYROID BODY.

Goitre, or bronchocele, is a tumor which has attracted much attention in the present state of medical science, and which should not be attacked by surgical means until after having unavailingly made use of iodine, *the powder of Sency*, and other pharmaceutical resources which have been much extolled in these latter times; also it is requisite that the tumor should have sufficiently incommoded the patient to jeopardize his life. Serous, sanguineous and purulent cysts,

and vascular, erectile, fungous, aneurismal, tuberculous, calcareous, fibrous, schirrous, colloid, encephaloid, and viscous (gommeuses) tumors, have been confounded with the hypertrophy of the thyroid tissue under the common title of goitre. The surgeon therefore will not be enabled to undertake their cure with advantage until he shall have ascertained their species, or until having consulted the memoir of M. Sacchi (*Arch. Gén. de Méd.*, ser. 11, t. II., p. 246,) on this subject. *Caustics*, employed at the time of Celsus, and since by a small number of practitioners to destroy goitre, are no longer in use at the present day. The steatoma which extended from the superior part of the larynx down to the sternum, and which was cauterized and cured by *Pietsch*, (*Gaz. Salut.*, No. 34, p. 3, 1771,) was it in reality a goitre?

### § I.

*The seton*, which the elder Moreau, according to Burns, which Gérard, and especially Flajani, made trial of or saw employed with success, and which MM. Maunoir and Quadri have extolled as a new resource, is not obnoxious to the same objections. The advantages which may be derived from it have now been indisputably established by a multitude of authentic observations, and wherever, in place of a hypertrophy or fungous or cancerous degenerescence, the tumor shall be found to consist of cysts and liquid, or semi-liquid substances, its application has every thing rational to recommend it. Monro, moreover, is not its inventor. Rogier, (*P. Forest dans Bonet*, t. III., p. 67,) who speaks of it as in common use, recommends that we should insert two crosswise in place of one; also the rod of red hot iron passed through the tumor as mentioned by Bleigny, (*Planque, Biblioth.*, t. V., p. 189, in 4to,) was it not a species of seton? M. Quadri generally inserts it from above downwards, with an instrument similar to Boyer's needle, and for fear of wounding the vessels rarely carries it farther than half an inch deep. However small the mass to be destroyed may be, he introduces two, three, and even four at different points. The goitre soon commences to shrink, and the resolution, which is effected by degrees, continues to go on in most cases, even after having withdrawn the meche, and after the wounds have cicatrized. The thyroid gland is frequently the seat of an indurated enlargement. I have seen those that were schirrous, and Burns and M. Wardrop have found in them encephaloid matter and *fungus hematodes*. But the facts mentioned by the surgeon of Naples, do not prove that the disease may be cured in such cases by the seton. The three cases which are related by M. O'Beirn, (*Arch. Gén. de Méd.*, 2nd ser., t. VI., p. 415,) are not very conclusive. M. Nick, (*Gaz. Méd.*, 1835, p. 311,) who approves of it, and who alleges that by means of the seton M. Klein has succeeded in six cases out of seven; and M. C. Hutchinson in two out of three cases, and M. Hauslentner also in two cases; has not been enabled to avert the censures which have been cast upon this method by Sommerville and Kennedy, (*Gaz. Méd.*, 1837, p. 311.) It was with cysts that M. Addison (*Ibid.*, 1837, p. 25,) obtained the three successful results that he mentions, and the case cited by M. Vado, (*Thèse*, No. 123, Paris, 1832,) also does not relate to a tumor of a

bad character. In severe cases it has been proposed to apply the ligature upon the bronchocele, to extirpate it or to ligate the principal arteries which enter into it.

### § II.—*Ligature.*

It is to Moreau, surgeon of the Hotel Dieu, that Valentin ascribes the suggestion of attacking goitre by the ligature. One of the patients thus treated in 1779 was not cured, but the other recovered perfectly. The tumor in the first was a cancer, that of the second was of a fatty nature. The surgeon inserted a double ligature through its base, as if for the purpose of dividing it into two equal parts, which he afterwards strangulated separately. Some years subsequently, viz., in 1791, Desault also had recourse to it, but it was for the purpose of terminating an extirpation, the last stage of which was attended with too much danger. Brunninghausen used it with entire success in 1805, to destroy an enlargement of the size of an egg, which was situated at the fore part of the neck, between the larynx and sternum, in a young man 25 years of age.

A child 12 years of age, operated upon by M. Mayor in 1821, for a goitre of the size of an orange, was discharged from his hospital perfectly cured at the expiration of a month. In a young man 21 years of age, the tumor occupied the front part and both sides of the neck, and extended from the angles of the jaw and the parotid region, as far down as to the sternum and clavicles. Of the three lobes of which it was composed, one, or that of the middle, equalled in volume the head of a 7 or 8 months' foetus. The entire mass below the jaw was nine inches in height and 26 in breadth. The general condition of the patient was bad, but M. Mayor nevertheless effected a radical cure in less than two months! Nor was he less successful in a lady of Sackendorf, who had in vain consulted the most distinguished medical men of all countries for the removal of a tumor, which she had had for the space of about thirty years. This tumor, which continued to increase, occupied the entire left side of the neck, had pushed the larynx to the right, and appeared seriously to compromise the life of the patient. His process consists in laying bare the anterior surface of the bronchocele, in afterwards isolating it from the subjacent parts by means of the fingers or the handle of the scalpel, and then applying a strong ligature upon the root of each of its lobes, or traversing its base with a double ligature, which admits of its being strangulated above and below. In place of one or two ligatures he sometimes employs as many as four, each one of which is then made to include a fourth or third of the gland, and as may be supposed, the chaplet constrictor is the one to which he accords the preference. From these details, nevertheless, it is evident that the ligature here is but an auxiliary means, or a resource against hemorrhage, when we are fearful of wounding some vessels of importance; and that if we were sure of avoiding all the large arteries with the bistoury, extirpation would be still far preferable. It is an operation, moreover, which is not unattended with danger; and two of the patients operated upon by M. Mayor himself, perished. It causes suffocation, extreme anguish and difficulty of respiration, and frequently

some of the symptoms of typhoid fever. The soldier of M. Malle, (*Thèse de Concours*, Strasbourg, 1836, p. 27,) created the greatest degree of alarm in the mind of the operator. Consequently I should not recommend it, except the tumor is first detached by means of the cutting instrument or fingers to as great an extent as is possible, in order that there may be a pedicle only instead of a large base to be strangulated, and upon the condition also that the goitre should be promptly excised, external to the ligature, and not left to putrefy in the wound.

### § III.—*Obliteration of the Arteries.*

Some practitioners have supposed that by tying the thyroid arteries we might probably obtain the resolution of the goitre. Burns ascribes the first suggestion of this practice to W. Blizzard. The patient operated upon by this surgeon did very well during the space of a week; but repeated hemorrhages and hospital gangrene, which soon exhausted him, ultimately caused his death. Since that period, viz., in 1814, M. Walther, who adopted the precept of the English surgeon, performed the operation with entire success. The same is to be said also of M. Carlisle, and we are indebted to M. H. Coates for another successful result. M. Earle, M. Green, and M. Chelius, have been no less fortunate; and M. Boileau being compelled in 1825 to tie the carotid for a traumatic lesion, had the satisfaction not only to save his patient but also to cure him of a goitre, which had troubled him for a long series of years. M. S. Cooper, however, informs us that a ligature upon the thyroid vessels, as performed by M. Brodie, produced no diminution in the volume of the tumor. It is necessary also to add that M. Langenbeck, having been obliged to tie the two carotids after having tied the right superior thyroid artery nine days before, saw his patient die on the following day. These facts, though not very numerous, are nevertheless sufficient to induce us to submit a remedy of this kind to new trials. We ought especially to attempt it in pure and simple bronchocele or hypertrophy of the thyroid body, and in all cases where the vascular system predominates in the tumor. Instead of one or two, we should in my opinion tie the four thyroid arteries; otherwise it is to be feared that the blood which is arrested upon one side, may come out again from the other. The operation after all, has nothing in it formidable to the skilful surgeon. If the natural pulsations of the vessels which are to be laid bare are not sufficiently strong to serve as a guide for the instrument, we must proceed to seek for each thyroid artery, where they are given off from the carotid for the upper ones, and on the inner border of this trunk for the lower, following out in other respects the rules elsewhere laid down.

### § IV.—*Injections.*

If there should be a cyst, whether serous or sanguineous, irritating injections, as recommended by Rullier and others, might have some chance of success. I would not recommend them to be made with chlorine, as has been suggested by M. Decondé, (*Encyclog. des Sc.*

*Méd.*, 1836, p. 6,) but I would willingly make use of the solution of the tincture of iodine, in the same way as for any other cyst.

### § V.—*Incisions.*

Having noticed that an enormous purulent goitre which contained calcareous concretions, and mention of which is made by Sellié, (Rougemont, *Bibl. du Nord.*, p. 134,) was cured by making an incision into its tumor; that M. Beck (*Arch. Gén. de Méd.*, 3e sér., t. I., p. 319,) had succeeded in two out of three cases, by excising a part of the cyst; and that a thyroid cyst, which had suppurated, was also cured by incision in the case of M. Rey, (*Thèse*, No. 79, Paris, 1834,) and in that of M. Laugier, (*Dict. de Méd.*, 2d edit., t. IX., p. 180;) I have established a method (*Bull. de Therap.*, t. XI., p. 344,) which still better secures the success which has been obtained, by means of four incisions on as many different thyroid cysts, by M. Petrali, (*L'Expérience*, t. II., p. 173.) I incise the tumor on four or six points of it, according to its volume, giving to each incision an inch in length. By means of the finger, here introduced, I empty and cleanse the cyst; I then pass into these wounds a meche of ravelled linen, which is to be moved in the manner of a seton during the space of four or five days, until the suppuration has been perfectly established; I then withdraw them, and the tumor from this time is treated as an abscess. Three patients have been operated upon by me in this manner at the hospital of La Charité, and another in private practice. The disease in the three cases was an enormous purulent goitre; two of these were cured in six weeks, and one died; the fourth case had a sanguineous cyst with thick walls, and recovered. Incision of *thyroid tumors or cysts* also is far from being always exempt from danger. M. Bégin, (*Elem. de Chirurg.*, 2d edit., p. 23,) being desirous of incising a tumor of this description, which rested upon the trachea, cut down upon a vascular areolar mass, the extirpation of which was impossible, and the incision into which, which had already caused repeated bleedings, might have been followed by a fatal hemorrhage. The operation was not completed, and the patient recovered, but retained his tumor.

### § VI.—*Extirpation.*

By means of extirpation we remove the totality of the disease, and the patient is promptly relieved of it; but it is attended with so many and such formidable dangers, that the great majority of authors, at the present time, agree in proscribing it.

A. That, at the time of Albucasis, a patient who was submitted to this operation should have died of hemorrhage, has nothing in it very surprising; that the young lady mentioned by Palsin succumbed during the operation from the same cause, we may also readily conceive; though one of the patients cited by Gooch perished, exhausted at the end of eight days, and that in order to save the other it became necessary that the assistants should relieve each other during the space of a week, in order to compress without intermission, by means of their fingers, all the arterial branches which had been

opened; though an officer, whose history is given by Percy, also perished from hemorrhage, and that the patient operated upon by Dupuytren survived the ablation of the tumor but thirty-five hours; though the instances of extirpation of goitre adduced by Freytag, Theden, Desault, Giraudi, Fodéré, and the barber who, according to Paradi, performed it successfully upon his wife, may not all of them be very satisfactory; and though the young girl treated by Klein, (*Graefe und Walther's Journ.*, vol. I., p. 120,) was seized with an apoplectic fit and perished from it,—we should nevertheless be wrong in censuring, in absolute terms, the essays made to render us more familiar with this operation. Peckel and Ravaton (Pétrequin, *Bull. de Ther.*, t. XI., p. 344,) have performed it several times with success, and Vogel (*Bibl. Chir. du Nord.*, p. 391,) has been no less fortunate. M. Graefe, (*Gaz. Méd.*, 1835, p. 169,—Rufz, *Arch. Gén. de Méd.*, 2e sér., t. X., pp. 25, 41,—*Graefe und Walther's Journ.*, 1820,) who lost one of his patients, has cured two others. M. Green (*Lancet*, 1829, vol. II., p. 351,) succeeded in extirpating one of the lobes of the gland, and M. Warren, (*On Tumors, &c.*, p. 305,) who tied the carotid, also saved his patient. That of M. Roux (Rufz, *Arch. Gén. de Méd.*, 2e sér., t. X., pp. 25, 41,) died after the expiration of a few days; but that of M. Voisin (*Gaz. Méd.*, 1836, p. 372,) recovered perfectly.

The enormous tumor extirpated by M. G. Bell, (*Arch. Gén. de Méd.*, t. IX, p. 283,) soon repullulated. But the cyst removed by M. Gubian (*Ibid.*, t. XII., p. 315,) did not reappear. By combining extirpation with the ligature, as has been done by M. Mayor and M. Hédénus, (*Graefe und Walther's Journ.*, vol. II., p. 240,) there can be no doubt that in future some successes might be obtained from it. The most complicated cases could not intimidate this last mentioned surgeon, who in 1822 could already enumerate six successful results obtained by him. His process differs from that of M. Mayor in this, that he carefully dissects the bronchocele down to its deep-seated surface, and ties the arteries in proportion as they are divided by the instrument; and in this also, that with him the ligature, which he applies in other respects after the manner of the practitioner of Lausanne, but which he knots in the same manner as for obliterating a large vessel, has no other object than to strangulate what he dare not venture to divide, and to enable him to excise the entire morbid mass immediately, with security. For myself, however, I should not decide upon extirpation of an actual goitre, until after having satisfied myself that there was not any co-existing lesion of the heart or tendency to apoplexy, and that the surrounding lymphatic glands were sound; and until after having made trial of either the seton in the manner of M. Quadri, the simple incision indicated by Fodéré, and employed successfully by Delpech, or the numerous incisions which I have recommended, or as Rullier advises, an irritating injection into the cyst, if any exists, or the previous ligature upon the thyroid arteries; and not until after the pressing entreaties of the patient, and only in cases where the bronchocele instead of constituting only a simple deformity, forms a disease whose progress and character threaten the life of the individual.

**B. Operative Process.**—We will suppose that there exists a goitre

which involves every portion of the gland. The preparations are very nearly the same as for the removal of the parotid. The patient is placed upon his back, with the head gently reversed, and supported by assistants. The operator being situated on the right side, makes upon the median line a first incision, which commences above, and is to finish a little below the tumor; transforms this wound into a crucial incision; detaches the flaps, and dissects them down to their base; divides transversely the fleshy fibres which he cannot push aside, reverses them towards their attachment if they are sound, or comprises them in the subsequent excisions if they are diseased; ties such vessels as interfere with him; reaches by degrees the borders of the tumor, which he draws towards him while tearing rather than cutting it out, and finds deep down, at their superior and inferior part, the four principal arteries of the organ, each of which he isolates and surrounds with a ligature. Avoiding with care the trunk of the carotids, the internal jugular, the descending branch of the great hypoglossal nerve, the pneumo-gastric, and the great sympathetic and the cardiac nerves, which are seen a little farther to the outside, crossed by quite a considerable number of secondary veins, the surgeon then detaches the tumor at its upper part, from the sides and anterior face of the larynx, from which it is separated only by the thyro-hyoid muscles, cellular lamellæ, and some small arteries which must be tied, and which come from the lingual or maxillary branches. Returning towards its borders, which he raises and separates from the œsophagus or trachea, near which run the laryngeal nerves, he recognizes when the tumor holds no longer, except by its lower border, whether the venus plexus which issues from it, and the thyroid artery of Neubauer, which very frequently enters into it, would make its complete separation dangerous. If so he includes all these objects with a ligature, or traverses their pedicle with a double ligature, and strangulates them as powerfully, and as near to their root as possible, after which he may excise without any fear the totality of the goitre. So laborious and delicate a dissection cannot be rapid. The patient requires to be allowed to repose from time to time, in order to breathe. All kind of pressure upon the trachea or larynx should be carefully avoided, and the surgeon should vigilantly bear in mind that if the inspirations are not free, the blood will be instantly seen to accumulate in the veins, and to rush out in large quantities from the slightest cut of the bistoury.

Before proceeding to the dressing, it is important that even the smallest arteries should be tied or twisted. As to the veins, they will cease bleeding as soon as the patient shall be free from oppression and be enabled to dilate his chest freely and without fear. Should it be otherwise, the ligature must be applied to them. The convulsive movements and even death which have sometimes supervened, during the extirpation of tumors connected with a great development of the vascular system, might be attributed in this region to the introduction of air into the veins, (see Volume I.;) M. Boullay, (*Gaz. Méd.*, 1839, p. 79,) who saw a horse perish a few minutes after bleeding the jugular for an attack of pneumonia, ascertained that the air had been introduced in large quantity into the heart and vessels; but as I have already said, it remains for the fact

to be demonstrated in all the cases of this kind which have been related. The surfaces being thoroughly sponged and the ligatures brought to the angles of the solution of continuity, nothing more remains to be done than to approximate the flaps of the wound and to close it up more or less perfectly. As in front of the neck the centre of the division is more elevated than the sides, it cannot but be attended with advantage in undertaking immediate reunion, either by means of adhesive plasters or even a few points of suture, provided however that with the exception of a few ligatures we are not forced to leave any foreign body under the skin. The different portions of dressing moreover should be light and gently applied. All compression in such a region would be dangerous, and too great a number of pieces of dressing would cause an injurious accumulation of heat. Should the tumor involve only one side of the thyroid, or if independent of this gland this tumor should be on another point of the anterior half of the neck, the modifications which would require to be made in the process which I have described are too unimportant and too easily anticipated to make it necessary to point them out in detail.

#### ARTICLE IV.—TUMORS FOREIGN TO THE THYROID BODY.

Synovial cysts, loupes and lymphatic tumors, &c., may develop themselves in the neck as well as in any other region; but having treated of these in another chapter, it is not my intention to notice them again in this place. I have successfully removed an atheromatous cyst of the size of a large nut, which was situated in the supra-sternal fossa of a young American, between the layers of the fascia cervicalis; I have seen lymphatic masses and aneurismal tumors of the aorta elevate themselves from behind the sternum as high up as to the neighborhood of the larynx; but it has not fallen to my lot to effect the extirpation of a degenerate thymus, an operation mentioned by M. Haugster, (*Arch. Gén. de Méd.*, 2nd ser., t. III., pp. 109, 263.) There is still another sort of tumor of the neck, viz.: the emphysematous, upon which I have only one word to say. This tumor, in the case of M. Ollivier, (*Ibid.*, t. I., p. 421,) which followed a sudden crepitation, was situated on the supra-sternal region; in the cases of the English physician, (*Med. and Phys. Journ.*, June, 1833,) when irritated by exertions it extended itself rather towards the face, and in the case of M. Malle, (*Thèse de Concours*, Strasbourg, 1836,) or M. Bégin, (*Elem. de Chirurg.*, &c., 2nd edit., t. II., p. 24,) it was occasioned by the extirpation of a thyroid tumor. It is a description of tumor which is imputable to some laceration in the air passages, and which must be treated like any other emphysematous tumor.

## CHAPTER III.

## AIR PASSAGES.

## ARTICLE I.—BRONCHOTOMY.

Under the name of *bronchotomy*, it is my intention to speak of the artificial and methodical opening of the air passage in its cervical region, and not in that of the bronchi, as its etymology would lead one to suppose. At the present day, when it is performed on various points of the respiratory tube, the word *bronchotomy* ought to be applied to the operation in general, while in its special applications it would comprehend *tracheotomy*, *laryngotomy* and *laryngo-tracheotomy*. Asclepiades is the first, I believe, who ventured to perform it. No one before Antylus and Paul of Egina, had described it. C. Aurelianus, Aretaeus and most of the Greek authors repel the very mention of it; and Rhazes advises it only in cases threatening immediate death. Though Albucasis, in order to prove that the divided cartilages will reunite, cites a young girl who had cut her throat and who perfectly recovered; that Avenzoar made with the same object some successful experiments upon goats, it is not until we arrive to the year 1543, that we find this operation again revived by M. Brassavole. It is only since the time of F. ab Aquapendente, that all writers have admitted its utility, and even its necessity under certain circumstances. It is far from being the fact, however, that opinions have always been unanimous upon the cases which required it.

§ I.—*Indications and Appreciation.*

A. P. d'Abano, who calls it *subscannation*, and after him Gherli of Modena, G. Martine, &c., consider bronchotomy indicated in all cases of tonsillary or laryngeal *angina*, which threaten the suffocation of the patient; but, though advocated by Mead and Louis, their opinion, which goes back moreover as far as to the time of Avicenna, and which has been zealously opposed by Cheyne, is at the present day scarcely sanctioned except by Baillie and Fare. Anginas that are purely inflammatory, however intense they may be, rarely make it necessary to have recourse to a remedy of this kind. It would be difficult to comprehend why an acute engorgement of the tonsils, for which Flajani ventured to have recourse to it, should ever require it, unless it were impossible to open into the mouth and to penetrate down to the pharynx. The same may be said with greater reason of their chronic enlargement, which is relieved by excision with much less danger. When the tongue becomes swollen suddenly, in such manner as to fill up the mouth and close the arches of the palate, Richter and B. Bell, who recommend bronchotomy, had without doubt forgotten that in such cases two or three deep incisions upon the dorsum of the diseased organ will effect its diminution, and very probably were unaware of the observations of De La Malle on this subject. It would be difficult also for me to believe that it might

not have been possible to dispense with it in the case where M. Burgess performed it, since in that case there was nothing but an inflammatory intumescence, produced by a burn at the bottom of the buccal cavity. On the other hand it is almost universally admitted since the time of Desault, that it is not applicable to cases of submersion, and that Detharding, in prescribing it as a remedy in asphyxia from drowning, entirely misconceived the manner in which death takes place under such circumstances. Nevertheless, M. S. Cooper, who considers it more prompt and easy than the introduction of a gum-elastic catheter through the nose or mouth, justly argues, as it appears to me, that it should not then be proscribed without restrictions. Should the mouth be firmly closed, and it became impossible for the catheter to be inserted into the entrance of the larynx, bronchotomy would be better than nothing when it was important to act speedily and to force the air to pass into the lungs. When we reflect upon the difficulty of shutting up the glottis completely, by means of the tube which we insert into it, and of preventing the air, which is blown in, from escaping into the digestive passages, in all those cases in which the surgeon deems it proper to attempt artificial respiration, we cannot but be induced to accord to it a preference over simple catheterism.

B. *Œdematous Angina*, that is to say, a serous engorgement of the lips of the glottis, is still another disease for which bronchotomy appears to constitute the remedy par excellence. In sustaining the respiration, it gives the physician time to attack the disease by suitable remedies, and to the organism the means of subduing it, or at least of making farther resistance to it. The antagonists of Bayle, who was the first who mentioned it for such cases, reject it under a pretext which does not appear to me valid. Their permanent canula by the natural passages could not certainly remain without danger in the trachea during the space of from eight to fifteen days; while a canula which has been once inserted through the artificial opening into the respiratory tube, occasions very little inconvenience to the patient. I am of opinion, therefore, with M. Lawrence, that in this description of disease, which moreover is almost constantly fatal, it deserves some attention, and that it would offer infinitely better chances of success than scarifications of the infiltrated parts, as proposed by some practitioners.

The patient whom M. Roulois, of Mayenne, mentions in his thesis, and who was operated upon at the Hospital of St. Antoine in 1828, by M. Kapeler, died it is true at the expiration of thirty-six hours, but after having been restored as it were by a miracle from death to life, and dying very probably because the air could not be made to pass in sufficiently large quantity and uninterruptedly into the lungs. The case mentioned in the *Journal Complimentaire* was less unfortunate, inasmuch as he survived. A woman operated upon by M. Purdon, (*Arch. Gén. de Méd.*, 2e sér., t. II., p. 102,) also recovered. M. C. Broussais, (Coqueret, *Thèse*, No. 185, Paris, 1834,) was no less fortunate. Operating for a thickening of the mucous membrane of the larynx, M. Regnoli, (*Revue Méd.*, 1829, t. II., p. 520,) succeeded in two instances, and M. Senn once. M. Fournet has published two other *successful* cases. M. A. Robert has also communicated to me

two others which belong to him. I have performed tracheotomy but twice as a remedy in œdematosus angina, and both patients were cured. We should be wrong then not to have recourse to it under such circumstances.

C. *Tumors and engorgements in the vicinity.*—A polypus, or any tumor whatever in the nasal fossæ or pharynx, the thyroid body, or certain lymphatic ganglions, any of which have become swollen or so hard and voluminous as to prevent the air from passing into the trachea, do not render the operation indispensable, only so far as there may be imminent peril of suffocation, or if it shall have been found impossible or attended with too much danger to attempt the ablation of these morbid masses. It was, chiefly, for these cases only that Sharp reserved it; for it did not appear to him to be absolutely required in the extraction of foreign bodies. It might, moreover, be advantageously performed if, in consequence of a wound or otherwise, the larynx had become completely obliterated, as in the young man whose history has been given by M. Reynaud, (*Journ. Hebdom. Univers.*, t. III., p. 201.) M. Porter, (*Gaz. Méd.*, 1838, p. 392,) employed it with success in a case of gangrene of the epiglottis and hyoid region caused by suicide. M. Warren, who undertook to perform it in a patient in order to remedy the entrance of air into the veins; and M. Sampson, (*Ibid.*, 1837, p. 667,) who found nothing so advantageous to restore a *drunken man*, might both, however, in my opinion, have dispensed with it.

D. *Foreign Bodies.*—It is for the purpose of reaching heterogeneous substances which sometimes become introduced into the larynx or trachea, that the operation of bronchotomy, since the time of F. Monavius, has been most frequently performed. It has been made use of and might be employed in this manner, in order to extract clots of blood that have come from the mouth, or even from a wound in the larynx, lumbrici worms, a leech (*Lacretelle*), flies, portions of food, (*Thierry, Bibl. Méd.*, 1829, t. II., p. 450,) such as small fish bones, (*Willaume, Bull. de Fér.*, t. XXIV., p. 167,) fowl, pieces of mushrooms, apples, chesnuts, acorns, of polypus in the pharynx, a cherry pit, a prune, apricot, harrico bean, raisin-seed, melon-seed, (*Jameson, Bull. de Fér.*, t. I.,) a pill, a silbert, a coin of gold, piece of silver, locks of wool or tow, a ball, a marble of the diameter of 8 lines, (*Arch. Gén. de Méd.*, 2e sér., t. II., p. 125,) a button mould, a pebble, pin, needle, (*Blandin, Bibl. Méd.*, 1829, t. II., p. 450,) fibrous tumors, probably syphilitic (*Arch. Gén. de Méd.*, t. V., p. 564,) polypi (*Swin-ger, Morgagni, Lieutaud, Herbiniaux, Desault, Voigtel, Windt, Otto, Prinz, Albers, R. Gérardin, &c.*) and hydatids (*Aubertin, Delonnes, and Harless;*) encysted tumors (*Albert,*) fungous or sarcomatous tumors (*Tortual,*) lymphatic and warty tumors (*Wurtzer,*) schirrhous and cartilaginous tumors (*MacIlvaine in Urner, 1833, Obs. Méd.*, 1835, p. 116), developed in the interior of the larynx; a piece of cartilage, tendon, wood, iron, or membranous concretion; in a word, for the extraction of all bodies whatever, that may become lodged in the glottis or trachea. As soon as the presence of one of these objects in the respiratory passages is clearly established, we are justified, unless we can reach it better through the mouth by means of the fingers or forceps, in calling to our aid the resources of

bronchotomy. The sound of a small stone moving up and down, and which M. MacNamara mentions, (*Dub. Hosp. Reports*, vol. V., p. 592,) after having performed bronchotomy successfully in such cases in two instances, is a very good sign. In the case published by M. D'Arcy, the bean, though the accident had happened only a few hours before, had become swollen to treble its size. Though the first symptoms which these substances have produced may partially subside, it nevertheless will continue to be clearly indicated. In fact the monk who is mentioned in the *Eph. des Cur. de la Nat.*, and who was afraid at first to complain, died of phthisis, but not until after the expiration of two years.

One of the patients mentioned by Louis appeared so well that he was considered almost as cured, when he died near the expiration of the third week. Another, who lived several years with a Louis d'or in the bronchi, nevertheless ultimately died. Tulpian, V. D. Wiel, Bartholin, Pelletan and Dupuytren have also seen in certain cases the foreign body admit the respiration to reacquire, in some sort, its natural function, and not cause death until after one or more months, or even years. There are cases also in which, after the lapse of this space of time, the bodies have been expelled spontaneously; as for example, the chicken-bone mentioned by Sue. A lead pencil, an inch and a half long, was thus ejected after the lapse of six years, (Gridley, *Journ. des Prog.*, t. XIII., p. 269.) M. Guastamahia (*Gaz. Méd.*, 1838, p. 797,) mentions the case of a cherry-nut which was thrown out in a paroxysm of coughing, after having remained two months and a half in the trachea. Monteggia mentions a similar case of a tooth swallowed by a young lady. But these fortunate efforts of the system so rarely take place, that it would be imprudent to count upon them, or ever to dispense with bronchotomy under such idle pretexts.

E. *Foreign bodies lodged in the œsophagus*, and the inflammatory engorgement which wounds and injuries of the neck sometimes produce, have also induced some physicians to resort to bronchotomy in order to prevent suffocation and give time to attack the principal disease. *Habicot* performed it upon the spot upon a boy who, returning from the fair, found no better means of escaping from robbers than to swallow, inclosed in a packet, the pieces of gold which he had in his possession. He performed it in the same manner successfully in a patient who being severely wounded, was upon the point of perishing from inability to respire. This is the way in which we undoubtedly ought to act, should life be seriously menaced by the presence of foreign bodies in the œsophagus, or by an intumescence in the lips of a wound in the larynx, provided it should be impracticable to remove by any other mode and instantaneously the cause of the suffocation. A student of medicine, from suffering pain in the pharynx, supposed that he had swallowed a bone while eating soup. According to his account, this bone consisted only of a very small fragment. The exploration of the throat led to no discovery. The accidents which were at first quite serious, subsided by degrees; but about the twentieth day this young man was seized with suffocation, and vomited and threw up a corroded bone of the size of a nut. Bronchotomy, which nevertheless became necessary, was performed

by M. Sanson, and the general health of M. F. was gradually re-established.

F. *Croup*, or laryngeal and tracheal *diphtheritis*, that formidable malady, the nature of which has been no less clearly elucidated than its treatment by the admirable researches of M. Bretonneau, is one of those affections in which it would at first sight appear that bronchotomy might be resorted to with the greatest degree of advantage. Nevertheless, in spite of the assertions of M. A. Severin and Bartholin, and of some other practitioners of the seventeenth and eighteenth centuries, who assert that they had in many instances had recourse to it with successful results, the physicians of our epochs still doubted in 1825, if in a disease of this description it can be of any great value, or that there existed in science a single conclusive or well authenticated example of cure which could in reality be attributed to it. Those which are cited by M. S. Cooper, whether in his own name or in that of M. Lawrence, or of M. Chevallier, do not prove in fact that the cases treated by these physicians was legitimate croup. The case related in the name of Andree by Bursieri, Locatelli, Michaelis and White, is the only one which is accompanied with details sufficiently circumstantial to afford any satisfaction upon this point. The light in which bronchotomy has hitherto been considered would not enable us to derive any very great advantage from it in croup. We cannot, in fact, understand how it could remedy the inflammation or spasm of the larynx, which, according to Royer-Collard, &c., ultimately cause death in this disease; or the pulmonary engorgement, any more than it can the reproduction of the morbid product. In this point of view M. Caron has certainly exaggerated its importance, while MM. Desruelles, Bland, &c., have very properly contested its utility. But it is not in this way that it should be considered. Patients attacked with croup die from want of the ability to respire. This asphyxia, which is caused by a false membrane or the engorgement of the laryngeal membrane, does not depend on spasmodic lesions, which are rendered impossible or insignificant in the larger bronchi, the trachea and the larynx, by their cartilaginous texture. It is less with a view of extracting the membraniform concretions that we have recourse to bronchotomy in this disease, than for gaining time and placing the patient in a condition to breathe while we are devising the means for his cure.

M. Bretonneau has shown that when the trachea is once opened, we may introduce into it advantageously a solution of calomel, or even one of nitrate of silver, and follow up the false membrane as far as into the bronchi. Under this point of view, bronchotomy is a precious resource, which should be made use of wherever the disease, having reached into the larynx or below it, can no longer be attacked through the mouth by means of topical applications, and where, notwithstanding it has not yet passed beyond the first bronchial divisions. Unhoped for successes have come to the support of this doctrine. In the month of July, 1825, M. Bretonneau, being called to see Mlle. de Puységur, four years of age, whose three brothers had already perished from croup, and who herself was laboring under it to a violent degree, freely laid open the trachea; placed a canula in the wound; saw the false membranes escaping from it in great quantity

during the space of several days ; blew in calomel in powder, which was badly supported, subsequently the same substance diluted in water, and thus succeeded in saving this afflicted child. In a boy 7 to 8 years of age, and whom I had an opportunity of examining at Tours, in 1827, a month after his cure, and who in the most advanced stage of the disease had been abandoned as upon the point of expiring by his parents. M. Bretonneau laid open the trachea as in the preceding case ; saw life returning at the expiration of a few minutes : effected the extraction of numerous membraniform concretions ; and found himself under the necessity a short time after of introducing through the canula which he kept permanently in the wound, a solution of nitrate of silver as far down as into the bronchi, when, after various obstacles which were destroyed as soon as they made their appearance, the child was entirely restored. In October, 1831, the same practitioner was no less fortunate in a third patient. The child, which was 11 years of age, was considered as dead, when M. Bretonneau was sent for to him. He instantly opened the trachea, and after various accidents which were overcome by the most judicious treatment, this young patient was finally completely restored. Similar successes have been since obtained by M. Scoutetten (Coqueret, *Thèse*, No. 185, Paris, 1834,) M. Gendron (*Journ. de Conn. Med. Chir.*, t. I. et II.,) of Chateau du Loir, and by M. Gendron (*Acad. Roy. de Med.*, 1838, t. III., p. 391,) of Vendôme, M. Gerdy, (Chrestien, *Arch. Gén. de Méd.*, 2nd ser., t. V., p. 517,) M. Crozat (*Precis Med. d'Indre et Loire*, 1833, p. 5,) and especially by M. Troussseau, (*Journ. des Conn. Med. Chir.*, t. I. II., and III.) Out of 18 or 20 operations, M. Bretonneau at the present day counts five or six cures. Out of 60 cases and over, M. Troussseau points out more than 20 successful results. I must however remark, that I lost the four children upon whom I performed it, and that up to the present time, it has been unavailingly made trial of in a great number of patients at the Hospital des Enfants. It has been decided upon too late, as has been remarked by M. Maingault, (*Arch. Gén. de Méd.*, t. XXX., p. 419; 2nd ser., t. I., p. 129,) and the consecutive treatment requires too many precautions to allow of its succeeding with every one as well as it did with MM. Bretonneau and Troussseau.

G. There are also other diseases which it would appear to me might be advantageously treated by bronchotomy. *Laryngeal phthisis*, for example, and chronic phlegmasias, which ultimately result in producing a degree of *contraction in the glottis*, as in the case cited by M. Gintrac, (*Revue Méd.*, 1830, t. I., p. 106.) The air finding a free passage below the disease, would leave the larynx in repose, and would no longer interfere with the salutary efforts of the system. Moreover, we should thus be enabled to place through the new opening, should it become necessary, topical applications immediately in contact with the diseased part. Trials of this kind have been made since being recommended by me ; a pregnant woman affected with a syphilitic ulcer in the larynx, and upon the point of suffocating, was cured in this manner by M. Purdon, (*Arch. Gén. de Méd.*, 2nd ser., t. II., p. 102.) A man who had ulcers of the same character, accompanied with engorgement of the cordæ vocales, and whom I operated upon at the Hospital of La Charité, in the month of No-

vember, 1838, was also restored. M. Trousseau and M. Amussat, by operating in this manner in cases of tubercular phthisis, have prolonged at least the lives of some of their patients.

H. Horses affected with *cornage* also have the glottis contracted, and present to the observer experiments, all of which are at hand, in favor of what I have just advanced. Two of these animals employed in a manufactory of minium at Tours, recovered their ordinary condition of health after having had a large canula fastened into their trachea. M. Barthélemy (*Bull. de la Fac. de Méd.*, t. VII., p. 27,) and other veterinary practitioners, have cited cases that are nearly similar. Applied to man, these facts have not deceived the expectation of practitioners. M. Clouet, of Verdun, (*Journ. de Prog.*, t. XVII., p. 226,) caused a similar canula to be worn for the space of twelve years, by a woman whom a fistula in the larynx, and other wounds, had exposed to the risk of suffocation. Price imputed ten years of flourishing health to a remedy of this description. M. Bulliard, in 1824, restored to health a young soldier whom a chronic laryngitis, and not croup as he supposes, had brought to the verge of death after many paroxysms of suffocation, by placing in his larynx a canula, which the patient wore during fifteen months. M. Godèvè was no less fortunate, in 1825, in another patient, affected, he says, with an ulcer in the larynx, but rather, as I think, with an engorgement of the *cordæ vocales*, and who was enabled to remove his canula without any inconvenience at the expiration of six months. The patient of M. White carried it for the space of two years, and that of M. Senn eleven months. The same occurred nearly in the two patients operated upon by M. Regnoli.

I. *Recapitulation*.—In conclusion, bronchotomy is an operation to be made trial of in all cases, or nearly in all cases, where a mechanical obstruction from whatever source it may arise, has a tendency to produce asphyxia. M. Gendron, (*Journ. Hebdom.*, 1836, t. I., p. 380,) who has seen two cases, proposes even that should a fistula exist between the trachea and œsophagus, bronchotomy should be had recourse to in order to cauterize the fistula through his bivalve canula. The operation, in reality, has but little danger connected with it. If up to the present time it has not been more frequently performed, it is from its effects, except in cases of foreign bodies, not having been accurately understood; from its having been supposed, that in order to re-establish respiration it was sufficient to open any passage whatever for the air; and from not having reflected that if the artificial opening is perceptibly less in extent than the natural passages, the lungs remain incapable of completely performing their functions, and that, in such cases, the design of the operation is to a great extent defeated. This is a truth which, placed beyond all dispute by M. Bretonneau, I consider that I have established, and the practical consequences of which ought to be of the most beneficial character. In one of the horses just mentioned the tracheal canula was only six lines in diameter. As soon as the animal became fatigued, he was seen gasping and out of breath. A large canula an inch in diameter was substituted for the first, and the horse immediately breathed freely and could undergo the most violent exercise. In the little patients who were cured by the practitioner of Tours by

means of bronchotomy, was not the canula naturally too small, or made so by the concretions and mucosities which contracted its diameter? Though the symptoms of asphyxia momentarily disappeared, they were found speedily to return. But on the contrary, it was no sooner cleared out, or a larger canula made use of, than the child seemed to revive. The same effects were observed in the cases of MM. Bulliard, Senn and Troussseau, and I was enabled to demonstrate, on my part, to a great number of persons, the correctness of this observation in regard to the patients whom I operated upon at the Hospital of La Charité in 1837 and 1838. W. Cullen, (*Journ. de Prog.*, t. VII., p. 144,) who neglects to give credit for this suggestion to M. Bretonneau, collected, in 1827, other facts not less conclusive, in order to sustain it and to give currency to it in England. After all, every one may, on this point, experiment on himself. Should we, for example, diminish the volume of the column of atmospheric air which is naturally inspired into the lungs, or diminish the openings of the nostrils one-half or two-thirds of their dimensions, by closing them upon a portion of quill or gum-elastic catheter, and keeping the mouth shut; the respiration will not be arrested, but it will soon become painful, and so much the more so in proportion as the passage for the air shall be more contracted. It is important then, when we venture to have recourse to bronchotomy, with the view of sustaining an artificial respiration beyond the space of a few minutes, that we should open largely into the respiratory tube, and that we should leave in the wound a canula also of very large diameter.

### § II.—*Examination of the Methods.*

This leads us to examine which ought to have the preference, tracheotomy, laryngotomy, or laryngo-tracheotomy. The ancients had no occasion to discuss this question, as they attempted only the opening of the trachea. The opening into the crico-thyroid membrane, has only been employed in practice since the time of Vicq-d'Azyr, who proposed it before the close of the last century. Desault is the first person who suggested the division moreover of the thyroid cartilage upon the median line, and it is to Boyer to whom we are indebted for the idea of incising at the same time from above downwards, the cricoid cartilage and the first rings of the trachea.

A. *Laryngotomy*, after the manner of Vicq-d'Azyr, and adopted by a great number of surgeons, possesses the advantage of being the most easy method, of acting upon a membrane which is but slightly organized and superficially situated, of not incurring the risk of wounding any vessel or any important organ, and of leaving the glottis intact; but on the one hand, it does not procure an opening sufficiently large to admit of the introduction of instruments required for the extraction of foreign bodies, while on the other hand, the canula which it would allow us to employ would be rarely large enough to admit of a sufficient quantity of air. In imitating Desault on the contrary, as has been done in America and in England, and as is also practised by M. Whithley and M. Blandin, we open into the larynx as freely as possible, and no vein or artery of

any size runs any risk of being divided. It is the only means in some sort of laying bare the foreign bodies, which in most cases become imbedded or arrested between the lips of the glottis, or the polypi or other vegetations, which also are rarely seen except in the vicinity of this part. Nevertheless, though the lesion of the *cordæ vocales*, which has been so much dreaded by those who have opposed Desault, may be easily avoided, and is moreover a matter of little consequence, and though the voice in patients treated by this method may not have suffered more injury than by any other, it does not however merit the preference, except in the cases which have just been pointed out; moreover, the patient should not have reached that time of life, when the thyroid cartilage has become charged to too great a degree with phosphate of lime. Should the dread of wounding the *cordæ vocales* deter him, the surgeon would have to do nothing more than to adopt the advice of *M. Fouilhoux*, and in order to avoid them, divide the thyroid cartilage upon its side, and then lay open the soft parts of the glottis transversely. When the foreign body is situated below the larynx, or that it becomes advisable to insert a tube into the wound, it is evident that this process can no longer be applicable. Perhaps rigorously speaking, it might even be possible to replace it always by another operation which has been proposed by *M. Vidal (de Cassis)* with the view of opening abscesses of the glottis, and also by *M. Malgaigne*; an operation, the first suggestion of which no doubt was derived from the experiments of Bichat upon the voice, and which consists in penetrating into the larynx through the thyroid membrane. Nevertheless an operation of this kind has something in it repugnant, at least at first view, which admonishes me to dwell no longer upon it, notwithstanding it succeeded very well in the trials which I have made with it upon the dead body.

B. *Laryngo-tracheotomy*, which ordinarily leaves the thyroid gland entire, and which incurs the risk of wounding only the crico-thyroid artery, does not enable us, like the method of Desault, to examine into the bottom of the larynx; being too remote from the bronchi for foreign bodies, possessing but little mobility, to reach with facility the opening which has been made, the division at the same time is in too near proximity to the glottis, not to render the employment of a permanent canula dangerous; so that in spite of its inconveniences, tracheotomy still appears to combine the most advantages under all circumstances where the method of Desault is not absolutely required.

C. *Tracheotomy*.—The trachea, which is a sort of cylindrical canal which descends to a line with the second or third dorsal vertebra, and composed of about twenty cartilaginous rings and resting against the œsophagus rather more on the right side than on the left, is covered: 1st, by the common integuments; 2d, by the cervical aponeurosis; and 3d, by the uniting bridle of the thyroid lobes close to the cricoid cartilage; lower down by the supra-sternal venous plexus, and the middle thyroid artery when that exists; 4th, slightly upon its side by the sterno-hyoid and sterno-thyroid muscles. Accompanied posteriorly by the inferior laryngeal nerve, and at a considerable distance from it by the primitive carotids, it is sometimes crossed by one

of the thyroid arteries, which in that case goes from one side of the neck to the other. In infants especially, the trunk of the innominate almost always conceals its anterior surface, even as high up as above the thorax; so that the right carotid also does not leave it until at a point very high up, where it takes a situation completely on one side of it. I have also seen the left carotid originate upon the right side and pass in front of the trachea, in order to reach its usual destination, and that of the right side do the same. Other vascular anomalies also have been met with in this region, and deserve no less attention than the preceding. From all these relations it results that the trachea, which is sufficiently superficial above, where the thyroid gland, which protects moreover its lateral portions, alone almost separates it from the integuments, becomes deeper and deeper in proportion as it descends or inclines towards the chest in order to follow the thoracic concavity of the spine, and that at the lower part of the neck we are obliged to seek for it more than an inch deep under the integuments. Finally, from the great mobility it possesses we might very readily, when seeking to lay it open, if we were not on our guard, push it so much aside that the instrument might fall upon the primitive carotid, as happened in a case mentioned by Desault, and where it is seen that a pupil of medicine, who was in a state of asphyxia, was killed in this manner by one of his companions who was endeavoring to save his life.

I. The *ancient authors*, who recommended bronchotomy, restricted themselves probably like Antylus, to dividing transversely at the middle of the neck the integuments and space between the third and fourth rings of the trachea. J. Fabricius is the first person who proposed to perform the operation in two stages: first, to incise the soft parts from above downwards upon the median line, and then to open into the respiratory duct in the manner performed by the ancients. He recommends moreover that we should leave in the wound a small straight canula furnished with wings; a canula which Casserius caused to be slightly curved, which, according to C. Solingen, should be flattened, the external opening of which Moreau covered with a small portion of lint, and Garengeot with a piece of muslin, in order to intercept foreign bodies. In order to prevent its obstruction and not to be compelled to withdraw it when we wish to clean it, G. Martine found an advantage in inserting two, one within the other. Ficker, who adopts the idea of Martine, requires that the outer one should be made of silver and the inner of gum-elastic, and that both should possess a certain degree of curvature; finally, some moderns have maintained with Ferrein that it could be advantageously replaced by a portion of quill. The manner of inserting and fastening this canula has varied no less than its form. Sanctorius adjusted it by means of a trochar, and Dekkers inserted it into the trachea by dividing also the skin with the same instrument. Moreau made a passage for it between two rings by means of a simple lancet, and Dionis suggested that it should be conducted into the tracheal tube upon a probe. That of Bauchot is very short and flat, and its inventor, who moreover made use of a kind of crescent mounted upon a handle in order to steady the larynx, had, like Dekkers and Sanctorius, a stilette of the same form, with a cutting edge at its extrem-

ity, that it might traverse the skin and penetrate, by the same movement, into the trachea. Richter (*Biblioth. Chir. du Nord*, p. 234) incurvates the instrument of Bauchot into an arc, with the view of rendering it more supportable, and maintains, as M. Collineau (*Arch. Gén. de Méd.*, 2d ser., t. I., p. 589) has done since, that by means of the puncture from the wound of the trachea being immediately filled up by the canula, the hemorrhage becomes infinitely more difficult than by incision of the tissues. But this is an error, and whatever Bergier and B. Bell may have said of it, all these modes of arriving by a single operation into the canal, are at the present day generally and properly proscribed. The fear of wounding the *cartilages* also, again revived by Purmann, no longer attracts the notice of any one. Heister has clearly demonstrated that we may divide them without the slightest risk. Vigili of Cadiz who was obliged to divide them as far down as to the sixth ring in a soldier, in order to prevent the danger of suffocation which the ordinary incision had produced by causing an effusion of blood into the trachea, and who, in place of a canula, kept in the wound a piece of sheet lead curved upon its borders and perforated with holes, found no reason to regret it. Wendt, with the view of extracting the half of an acorn, ventured to incise three of these cartilages, and Percy on this subject advises that we should use the scissors instead of the bistoury, which latter however is much more convenient, and preferred with good reason by almost every practitioner.

II. It is doubtless already anticipated what are my views upon the importance of these numerous modifications of processes. In the first place, I would recommend the rejection of every kind of transverse incision. If the obstruction to be removed is a *foreign body*, the division of one of the intercartilaginous spaces will not prove sufficient, and if the object of the operation is to *enable the patient to breathe*, a wound of this description will never be found sufficiently large. If any other proof were found wanting, it would be found in a case operated upon in my presence in one of the large hospitals. The opening of the trachea had been well made and the canula properly adjusted, but it was a portion of gum-elastic catheter, and the patient compelled to breathe through so small a tube found himself partially relieved only of the suffocation, which it had been attempted to remove by means of the bronchotomy. In the first case the canulas and perforated plates are useless. As soon as the trachea is free we must reunite the wound or let it close up. If the foreign body is movable, the air of the lungs may expel it outwards. If it does not present itself spontaneously at the wound, we must proceed to search for it in the direction of the bronchi, by means of a pair of curved and delicate forceps or some other appropriate instrument. When it becomes impossible to reach it or meet with it, it must be abandoned, and the wound left open and the patient dressed. On the following day or the day after, it is generally found on the deep-seated surface of the dressing. Desault, Pelletan and Dupuytren have in this manner noticed the expulsion of a bean, kernel of fruit, piece of money, &c., and the needle that M. Blandin was unable to seize, after having divided the thyroid cartilage, also made its exit in the same way. In the second case the canula is indispensable, but as no author had

pointed out the importance of a *large and permanent* opening in the trachea, none of the tubes that have been proposed answer the purpose. That of M. Bulliard is cylindrical, long and strongly curved. M. Bretonneau has caused several successively to be constructed of various kinds. The canula which he used in Mlle. Puységur is double like that of Martine, and flattened, slightly concave on its inferior border, and four lines in breadth in its greatest diameter. That which he used in the patient whom I saw, is formed of two halves, one superior and the other inferior, which are placed separately in the wound, and which when once reunited, present no other than an instrument analogous to the preceding. M. Scoutetten, (Coqueret, *Thèse*, No. 185, Paris, 1834,) M. Lawrence, (*Ibid.*, p. 21,) M. Troussseau, M. Coqueret, (*Thèse*, No. 185, Paris, 1834,) M. Moreau, (*Gaz. Méd. de Paris*, 1838,) Boyer, (Coqueret, *Thèse citée*, p. 24,) M. Sanson, &c., have since contrived others; so that at the present day we possess those that are simple, double, flattened, cylindrical, eyed, cribbed, and bent into an angle or curved into an arc. In ordinary cases that of M. Bulliard is most convenient; under other circumstances we should have recourse to M. Gendron's, (see the *Atlas*;) the important point is, that it should be sufficiently large and frequently cleansed.

III. Whether we do or do not wish to make use of a canula, some persons have proposed that we should not restrict ourselves to a simple section of the cartilages of the trachea, but remove and *excise a flap of the anterior wall of this canal*. It appears that veterinary surgeons very frequently proceed in this manner. Andrée also appears to have followed this process, which is formally recommended by M. Lawrence, M. Porter, (*Dublin Hosp. Rep.*, vol. V., p. 560,) &c. But it is a precaution which is at the same time wholly useless as well as dangerous: useless, because the pure and simple incision always enables us to introduce the artificial tube; dangerous, because if it should become afterwards advisable to let the wound close up, there would necessarily result from it an incurable contraction of the respiratory passage. Consequently the process of M. Collineau, (*Thèse*, No. 676, Paris, 1829,) to accomplish this loss of substance, and at the same time to render every kind of hemorrhage impossible; a process which consists in perforating the trachea by means of a cutting-plate, making a projection upon the circumference of a flattened disc of copper heated to a white heat, and which is mounted upon a long handle, in my opinion appears to possess no utility, and ought to be abandoned, as well as the advice of MM. Carmichael and White, which has the same object in view.

### § III.—*Operative Process.*

A. The instruments for bronchotomy are composed of a straight or convex bistoury; a blunt-pointed bistoury; several canulas armed with threads, and everything which may be required to attach them; very delicate ring and polypus forceps; several simple ligatures and some needles; erigues or sounds curved in the form of hooks, and various articles of dressing. The patient being placed upon his back, should have the head only slightly reversed. Verduc has shown

that by inclining it too much backwards the respiration is rendered more difficult, a remark which is applicable, moreover, to all the modifications of bronchotomy. The surgeon being placed on the right, in order to incise from above downwards, and not from below upwards, as some persons recommend, grasps and steadies the larynx with his left hand, while with a convex or straight bistoury in his right hand he divides the tissues.

I. *Tracheotomy*.—In order that tracheotomy may be well performed, it is necessary that the wound of the soft parts should extend from the neighborhood of the cricoid cartilage as far down nearly as the sternum. After the integuments and aponeurosis we come to the vessels which are to be tied in proportion as they are divided; the veins of the thyroid plexus, which should also be tied when it appears impossible to avoid them; then the middle thyroid artery, when it exists, and which it would be dangerous to wound. When arrived upon the front of the trachea, should the blood flow in abundance and no necessity exist for haste, we may rest for some minutes in order that the respiration may arrest the hemorrhage; but if it is necessary to be rapid we hasten to pass threads around the vascular branches which bleed; or, what is still better, we immediately proceed to lay open the respiratory tube itself. Though the straight bistoury, held as a pen, is sufficient for effecting this opening, which ought to comprise at least the fourth, fifth, and sixth, if not the third and seventh cartilaginous rings, there are, however, practitioners who prefer the blunt-pointed bistoury to extend the incision after the puncture. I see neither any inconvenience or advantage in this: though even the point of the instrument should touch the posterior wall of the respiratory tube, which seems to be so much dreaded, there would probably result from it no very serious danger. This part of the operation being terminated, we proceed differently, according as we have to extract a foreign body or to relieve the suffocation. In the first case, should the body which is to be removed not be expelled instantly, then if it presents itself at the wound, whose lips the operator is to cautiously separate apart by means of the ring forceps or hooks, we endeavor to reach it with a suitable instrument, and to draw it out. When it remains immovable in the direction towards the bronchi, which, as Favier has shown, is quite rare, we insert, with every precaution possible, in this direction a suitable forceps or a small scoop, in order to detach or seize it. Should such researches prove unavailing, they should not be too often repeated. Should the surgeon have no other object in view than to establish artificial respiration, he immediately proceeds to adjust the canula. Having seized it, he places it in the trachea, while with the ring forceps he separates the lips of the wound wide apart. By conducting it upon a probe or canulated sound, which serves as an axis to it, I ordinarily succeed in introducing it into the wound without any difficulty. If during the operation the venous hemorrhage should be too abundant, and resist the ordinary means, we should not get alarmed and, in our fright, abandon the patient, as Ferand did in a similar case. If the patient is at the age of reason, we should soothe him and induce him to respire as freely as possible, when the blood soon stops of itself. Should any of it escape into the trachea and give rise to

accidents, it would be an additional inducement to imitate Vigili, and immediately lay open the respiratory tube largely, as I did in one instance successfully in 1838. We might also, after the manner of M. Roux, (*Lancette Franc.*, t. I., p. 182,) should the danger be pressing, apply our mouth on a tube or the end of a gum-elastic catheter, introduced into the wound in the trachea, in order to suck out the extravasated fluids which lead to the apprehension of suffocation.

II. *Cricoidean Laryngotomy*.—When we wish to lay open the lower part of the larynx the incision is to commence at the projecting angle of the thyroid cartilage, and descend a little below the cricoid, without the necessity however of making it as long as for tracheotomy. The surgeon divides in succession, or with one cut, the skin, subcutaneous layer, and aponeurosis; separates the thyroid muscles; places the pulp of his forefinger upon the crico-thyroid membrane; endeavors to feel the artery of the same name; raises it up or depresses it with his nail, according as he wishes to incise it above or below; plunges his straight bistoury, guided upon the nail of one of his fingers, perpendicularly into the membrane; turns the cutting edge of his instrument upwards or downwards, according as he has succeeded in pushing the arterial arcade to one side or the other, and makes in this place an opening of the proper dimensions.

III. *Laryngo-tracheotomy*.—In order to transform the preceding operation into laryngo-tracheotomy, as M. Duchateau (*Thèse*, Strasbourg, 1823,) has in one instance successfully done, we have nothing more to do than to insert a blunt-pointed in place of the straight bistoury, and to enlarge the wound from above downwards by dividing the cricoid cartilage and first rings of the trachea upon the median line.

IV. *Thyroidean Laryngotomy*.—The same instrument directed from below upwards accurately upon the median line, would serve full as well to separate the two halves of the thyroid cartilage, after the manner of Desault. Upon the supposition that in spite of every precaution possible, the *crico-thyroid* artery has been divided, and that it may give rise, which is difficult to comprehend, to an alarming hemorrhage, it could be easily surrounded with a ligature upon its right and left, and it surprises me that a vessel of so little importance has attracted so much attention. The little finger inserted into the wound is first made to proceed in search of the foreign body, and then serves as a director to the forceps or other instruments which it may be deemed advisable to employ. As soon as the body is removed, the wound is to be reunited by first intention, and the cure is generally effected in a very short time. When, however, we have not been enabled to find it, the wound is to be left open and we proceed afterwards in the same manner as in tracheotomy. In my opinion, moreover, the *suture* recommended by some authors and used by Herhold, ought never to be made trial of, whatever Delpech and M. Serre say of it. The patient mentioned by Wilmer, and in whom it was made use of, died suddenly on the fifth day after the operation. It can only have a tendency, in such cases, to favor the extravasation of sanguineous or other fluids, either between the air passage and the tissues which surround it, or into the interior of this

canal itself, while the other containing means are always sufficient for reunion in a wound of this description.

V. *Thyro-hyoidean Laryngotomy*.—After having laid bare the thyro-hyoidean membrane upon the median line, by means of an incision about two inches long, it will be found less difficult than might be supposed, to reach the superior cordæ vocales, provided we divide it transversely above the cartilage which gives attachment to them. A bistoury plunged in at this point from above downwards and from before backwards, traverses the root of the epiglottis, falls immediately into the larynx, thus making for the finger or forceps a passage, which can be enlarged at pleasure, and which enables us to pass round the whole of the glottis without wounding in any way whatever either the cordæ vocales or the cartilages. No artery of any size nor any important nerve can be wounded. The laryngeal branch of the superior thyroid artery and the corresponding nerve are sufficiently distant from the median line, to enable us to avoid them with ease, and no venous plexus is encountered at this point. The wound made by this operation might have, I should think, some tendency to remain gaping open, but it is probable that in living man the inflammation would speedily approximate its borders, and that cicatrization would be effected without difficulty.

B. If our intention is to restore the respiration of the patient, and not to extract any foreign body from the aerial passages, the surgeon having satisfactorily removed the suffocation, has still to attend to two things, to wit, the disease of the larynx and the canula which he has left in the wound. Under the first point of view therefore he will have recourse to antiphlogistics, general or local, to resolvents, detergents and even caustics, either by the mouth, or on the skin or wound, and to blisters, antisyphilitics, &c., according as the disease may be laryngitis, croup, ulcers or a venereal affection of the larynx. As to the canula, it is important to have at least two of them, and that they should be changed or cleansed as often as the respiration appears to be incommoded. They are to be kept in place by means of two ribbons of some breadth, which are to be crossed on the nape and brought forward to be attached by a bow-knot in front of the neck at the supra-sternal fossa. Patients should wear this canula as long as the air does not pass freely through the glottis. There are some, moreover, who dispense with them without danger at the end of the first or second month, while there are others who have to wear them for one or several years, and even during all their lives.

#### [LARYNGOTOMY AND TRACHEOTOMY FOR FOREIGN BODIES, CROUP, ETC.

There will doubtless be sufficient time to make improvements in the method and instruments to be employed in laryngotomy, and in tracheotomy, for croup, &c., after the operation itself shall have ever received the sanction of the profession, under any circumstances except for the removal of foreign bodies. Though the *pathological* condition of the system, which results in the production of the false membrane in croup, even throughout every ramification of the bronchial tubes, has no parallel with the perfectly sound state of the air passages, when foreign bodies have become lodged there, still the

restless impatience of innovation is such, that some surgeons have already, before the propriety of the operation in croup, *at all*, is yet decided upon, begun, like Dr. Morand among others, (*Recueil des Travaux de la Soc. Méd. d'Indre et Loire*, in *Gaz. Méd. de Paris*, 1846, XVI. année, 3e sér., t. I., p. 210,) to refine upon the character of the wound and the nature of the instruments required to perfect the process in question. Thus, to prevent asphyxia, and the desiccation of the mucus of the passages, and the better to reach and draw out the glove-like prolongations, he proposes to *open into the trachea largely*, also to dispense with the canula, and to *dilate* the wound by instruments for that purpose, and then to place over it a thin gauze, in order that it may become moistened by the air expired. The dilatation of the wound must expose to greater hemorrhage, and therefore to greater danger of blood passing into the trachea, and strangulating the patient. As to the hope of thinking to extract the false membrane after it is once formed, it appears, in our judgment, altogether chimerical.

Mr. Lawrence thinks laryngotomy by a small aperture, with the two-edged bistoury, into the crico-thyroid membrane, quite sufficient, and preferable to tracheotomy in all cases where we desire to obtain artificial respiration. The former is unattended with danger, while in the latter we may have serious hemorrhage from the thyroid veins, (*London Med. Gaz.*, June 20, 1845.) But the serious character of the hemorrhage, as we have explained in our notes, arises from the danger of some particles of blood getting into the trachea, and causing immediate convulsive strangulation, suffocation, and death. This is most to be apprehended in children, wherever the opening may be made, as the vessels, especially the veins, become enormously distended, and enlarged, and engorged, by their cries and struggles, as in the case (*vide infra*) of the removal of a large dressing or shawl pin by Dr. Mott. Mr. Coote, in examining the false tubular membrane in a case Mr. Lawrence operated upon, found it to be a yellowish soft coating, extending throughout the minutest ramifications of the bronchi of the left lung. This adult had been laboring under bronchitis. (*Ib.*, loc. cit.) Mr. Coote ascertained that the membrane constantly preserved its *tubular character*, that it was of the thickness of the mucous membrane, and that it consisted of *pure fibrine*. Mr. W. Chapman, on the other hand, in a case of acute laryngitis, (*Lond. Lancet*, June 7, 1845,) made his incision longitudinal, and half an inch long, and just one inch above the sternum, and then introduced the tracheotomy trochar and canula. He insists that this is the best place in such affections, and especially because we thereby save the patient from the irritation caused by air passing *over the inflamed surface of the larynx*. He properly insists that it should be performed early, and before the last suffocating stages have arrived. This, we perceive, by what takes place in respect to the deposition of the false membrane above, is correct reasoning. Mr. Chapman saved and cured his patient. Mr. Liston also prefers *tracheotomy* in all diseases of the larynx and glottis, and in a majority of the cases of foreign bodies in the air passages, especially if they are in the trachea, (*London Lancet*, Nov. 23, 1844.) His object is to have a large opening, and also in laryngitis

to get below the disease. Where the canula has to be left in, Mr. Liston says the patient can generally clean the tube of mucus by putting the finger partially over the outer end of the tube, so as to narrow it, and excite resistance to the expiration, and thus promote a slight cough, (*Ib.*) A double canula allows you to clean one while the other is left in.

M. Vogelvanger (*Annales de la Société de Méd. d'Anvers, Gaz. Méd. de Paris*, and also the *Provincial and Med.-Surg. Journ.*, May 27, 1843, p. 247,) succeeded, in 1840, in extracting a large slice of a carrot, nearly an inch and a half in length, which had become impacted or wedged into the upper part of the larynx, in a girl between five and six years of age. As the incision into the trachea afforded relief to the respiration, as a return of suffocating symptoms took place when the wound was closed, and as the body could not be seen, the surgeon naturally thought this latter was above the wound made. Introducing, therefore, a dressing forceps upwards, the portion of carrot was immediately extracted, and the patient's life thus saved.

A remarkable and instructive case in which tracheotomy was performed, is one which occurred in the practice of Mr. J. Elkington, at Birmingham, England, (*Provincial Med. and Surg. Journ.*, April 22, 1846, pp. 184, 185.) The patient, a woman aged twenty-six, in the ninth month of her pregnancy, was seized, January 6, 1846, with a croupy cough, bloody expectoration, and loss of voice, which increased, together with suffocating paroxysms to such degree, that the trachea was opened at the usual place, January 17, which gave much relief. The same evening labor came on, and on the next day, January 18, she was delivered of a dead child without any difficulty. On the morning of the 19th she slept two hours. The breathing being then worse, the canula was removed, and at half past three, P. M., an attempt made to enlarge the opening, by which means a vein was divided and some blood got into the passage. At four a dreadful convulsion came on, and she expired. The appearances after death presented a false membrane of coagulum lymph on the entire mucous lining of the air passages, larynx, trachea, and bronchial tubes, down to their smallest ramifications. Here is an unequivocal and aggravated case of croup, in which leeching and other depleting and antiphlogistic measures do not appear to have been carried sufficiently far. This case also calls up again the subject of the extreme danger of the entrance of the blood into the trachea in tracheotomy, (*vide infra,*) and the question, how far the attempt to enlarge the wound may have led to the immediate fatal result.

A foreign body will play up and down in the *trachea* like a pea in a quill, for weeks, without other inconvenience than occasional fits of coughing. Finally it will become permanently lodged, probably in the rima glottidis, and may there suddenly cause death by suffocation during an access of coughing, as in the case of a pebble swallowed by a little girl, between two and three years of age, as related by Mr. Pitcher, (*Lond. Lancet*, 1844,) and also in the case of an infant, mentioned by the same surgeon, and in whom a piece of cabbage stalk was found, after death, to have got imbedded between the *cordæ vocales*. Laryngotomy would have saved both, perhaps.

The same surgeon, (*Ib.*) called to a child who had swallowed a tamarind stone, at once proceeded to open the trachea, but found no evidence with the forceps of any foreign body. Bronchitis ensued, and under the supposition that the operation might have caused this, the wound was closed up. Death followed, and a tamarind stone was found imbedded in the upper part of the right lung, having passed through the right bronchus. The lung was one mass of disease, and in quite a pulpy condition.

A girl aged 16, at the city of Dublin Hospital, is stated by Dr. Houston, (*Dublin Med. Journ.*, 1844, vol. XXV., p. 532, &c.) to have swallowed, about a month before Feb. 1841, a fragment of wood, while laughing with it in her mouth. She suffered especially at night from fits of coughing, and had a constant mucous rale, with stridulous croupy breathing. The coughing however, was always relieved by a sup of any liquid. Tracheotomy was performed by Dr. Houston, May 19, which brought on a violent paroxysm of coughing, probably from inattention to accurate sponging of the wound, and previous careful ligature or torsion to all the vessels, so as to prevent the slightest introduction of blood into the tube. [See what we have elsewhere said of the opinion of Dr. Mott, on this point.] During a violent paroxysm, and not until the month of August, was the fragment thrown up, which proved to be a *wooden peg of a boy's fiddle*, after which she recovered rapidly, though in fact her general health had never been impaired. It is remarked in this and all other cases, that the upper parts of the air tube about the glottis may be freely explored without causing any irritation, whereas it is the reverse in the direction towards the bronchi. In a child aged six years, a small brass nail, such as is used by upholsterers for covering chairs, got impacted with its point upwards into the sinus of the ventricle of the larynx, and with its head downwards below the glottis, and soon terminated in death, notwithstanding the operation of tracheotomy by the surgeon, Mr. Richeley (*Dublin Med. Journ.*, vol. XXV., 1844, p. 516,) asphyxia unfortunately having taken place before surgical relief was sought for. No mention is made of exploration of the larynx.

In confirmation of the above case, in which a fiddle peg remained for so long a time in the trachea, and also in proof of the necessity of our being on our guard against any hasty inference that no foreign bodies have been introduced, or that they have been discharged, merely because the suffocating paroxysms are immediately arrested by the swallowing of any liquid, we may remark that a similar, but much less aggravated case occurred to Dr. L. Pagen, (see M. Capuron, in *Arch. Gén. de Méd.*, 3d ser., t. VII., 1840, p. 369,) of France. A young child while playing with some beans, got one into the larynx, which caused symptoms of suffocation, but which were immediately calmed as if by enchantment, by giving it a *tea-spoonful of olive oil*. This remedy succeeded in the same manner, as often as the paroxysms supervened, until finally, at the expiration of *forty days*, the bean was expelled in fragments, by the efforts of the child itself. Where patients or parents will not submit to an operation, and where the danger is not imminent, we are thus at least furnished with a temporary

resource of great value, and which may in fact aid in accomplishing the ultimate spontaneous removal of the difficulty.

M. Petel, who has been (see *Arch. Gén. de Méd.*, 3e sér., t. XIII., 1842, p. 361, 362) one of the earliest advocates for tracheotomy as an extreme remedy in croup, and who cites three cures which he effected by this process, prefers for the operation the bivalve canula of M. Gendron, as modified by him. (*Journ. des Conn. Méd. Chir.*, October, 1841.)

Of late years many efforts have been made to introduce or revive tracheotomy for croup by MM. Bretonneau, Trousseau, and others, (see Valleix in *Arch. Gén.*, Oct. 1844, p. 256, et seq.) The operation will not be sanctioned in our opinion, for the following reasons: 1. As it cannot properly be substituted in the first stage, for a vigorous plan of antiphlogistic, emetic, and revulsive treatment, (viz., venesection, large blistering, leeching and emetics,) it will be had recourse to only in the last stage, merely to prevent immediate suffocation, and thus prolong life for a few hours. 2. Because it is an operation which is generally contra-indicated, and properly proscribed under any circumstances, or in any disease whatever at the period of infancy, or that when croup mostly occurs. This is because of the danger of either laryngotomy or tracheotomy, in them, as the smallest drop of blood passing from the incision into the trachea has been known to produce immediate strangulation and death. This accident is the more to be dreaded from the great vascularity of the parts, and the extreme distension of the veins, and therefore more abundant hemorrhage caused by the cries and struggles of the child during the operation; showing how incorrect it is in a surgeon of Paris to recommend, as has been done recently, with the utmost nonchalance possible, such an *innovation* even of tracheotomy as that of *direct puncture* through the crico-thyroid membrane by means of a trochar, with a cutting spring forceps inclosed, this too with the patient on his back. 3. Because in no sense could tracheotomy be justifiable as a *remedial* measure for croup, because in the first stage it would necessarily aggravate the symptoms, and again in the second stage, after the formation of the *finger of glove-like tubular membranous prolongations into the bronchi and their ramifications*, death could not possibly be averted by it. In illustration of the above remarks, we refer to the remarkable case of the successful extraction of a shawl-pin from the trachea by Dr. Mott. (See *Infra*.)

M. P. Jousset had already (*Arch. Gén.*, 4e ser., t. V., August, 1844, p. 402—416,) done full justice to the subject of tracheotomy in croup. As interne at that time in the Hospital des Enfans, at Paris, he had admirable opportunities of demonstrating the true character and structural ravages of croup and the inefficacy of surgical means. M. Jousset shows that the operation under the name of *bronchotomy* was performed at the remotest period of time, and for croup under the name of *angina gangrenosa*. Hence the mistake of the moderns, in thinking the disease and the operation both new, whereas M. Jousset clearly shows, that our own countryman, Dr. Samuel Bard, (*Ib.*, p. 401,) of New York, had many years since satisfactorily demonstrated that as respects the disease, the *angina gangrenosa* of the older authors was identical with croup. Out of 219 cases of the

operation, from 1782 to 1844, as collected by M. Jousset, it is ascertained that 40 only terminated in cures; while he has verified from the time of Galen to the present epoch 35 cases of croup or angina, which recovered by medical treatment exclusively, and that even after the expectoration of false membranes, of which 35, ten were cases in which false *tubular* membranes themselves were discharged. The practice of Van Swieten therefore, in favor of early tracheotomy in croup, undoubtedly the most rational period, and that of Louis, who after him considered it the only cure at any stage of the disease, as well as the modern advocacy of the operation, are wholly and vehemently proscribed by M. Jousset, except as an extreme and last resort to prevent immediate suffocation. In two such cases even it was in his hands followed by a cure.

*Tracheotomy in Spasmodic Dyspnea from Bronchocele.*—Dr. Handyside, of Edinburgh, (Cormack's *Monthly Journ.*, &c., Jan. 1845, p. 30, &c.,) in the case of a young man, aged 18, with hypertrophied condition of the thyroid body (bronchocele,) to great extent, causing distressing attacks of dyspnea and bronchitis, obtained immediate relief by cutting down through the right portion of the diseased gland to the trachea, which was displaced by it, and inserting a tube in the opening made into the windpipe. The profuse venous hemorrhage however, which followed, and which it was found difficult to restrain, had no doubt much to do in this case in allaying the pulmonary disease, and in promoting free muco-purulent-expectoration, and ultimately, in about two weeks a cicatrization of the wound and almost total absorption of the enlarged thyroid body. The case however is one of much interest surgically, and the operation was the true cause of its successful termination.

*Spontaneous Expulsion of Foreign Bodies from the Air Passages.*—In addition to the well-attested cases of the length of time during which such bodies may be retained in the trachea or bronchi, causing there chronic inflammation, and purulent or bloody expectoration for two or three years, and then be finally expelled by efforts of coughing, we may mention that of a man aged 42, mentioned by Dr. Duncan and Dr. Spence, (*Northern Journal of Medicine*, Aug., 1845.) This person letting slip two pieces of bone into his trachea while at dinner, in February, 1841, became affected with the symptoms as above described, which continued till March 2nd, 1845, when during a violent paroxysm of coughing he expelled the foreign bodies, one of which was rhomboidal and an inch long, and the other a slender fragment of nearly the same length. By June of the same year he had perfectly recovered. In another case, a boy aged  $5\frac{1}{2}$  years, while chewing an ear of grass in a field, got the same into his trachea in 1840, when he was attacked with the usual inflammation and expectoration of pus and blood, which finally threatened hectic fever, until during a violent fit of coughing 22 months afterwards, the foreign body was expelled. It was an entire ear of the crested dogtail grass. The boy recovered perfectly, (*Ib.*, loc. cit.)

M. Ehrmann, of Strasbourg, (*Arch. Gén.*, Mai, 1844,) had recourse, with success, to an incision into the trachea in a woman, for the purpose of extracting a *fibro-cellular polypus*, the upper part of which had extended up between the lips of the glottis. The whole

length of the lower left ligament of the glottis was closely grazed off by the bistoury.

*Foreign bodies in the Pharynx.*—Mr. R. Jackson, (*Edin. Med. and Surg. Journ.*, July, 1843,) describes a case of suicide in a woman, aged 42, who *designedly swallowed a key*, which lodged behind the glottis, with its ring part downwards. The severe inflammations in the air passages, with the abundant expectoration which ensued, but without deglutition being much interrupted by the foreign body, caused death in a few weeks. A very similar case occurred in a man named Gilbert. Dr. Handyside, also, has given cases (*Ib.*) of foreign bodies lodged in the pharynx; in one the body was rejected during a paroxysm of vomiting. (See notes under the head of *Oesophagus*.)

*Pharyngeal Fistula.*—Professor Albers, of Bonn, had the rare opportunity of examining (see *Graefe's und Walther's Journal*, Bd. XXX., Heft 3; also *Arch. Gén. de Méd.*, 3e ser., t. XIII., pp. 489, 490, 491,) in the year 1841, a case of pharyngeal fistula, immediately above the os hyoides, near the angle of the jaw, two inches in height and one in breadth, in a German soldier, aged 41. It was caused by a sabre wound, in the campaign of the French against Constantine, and, except for the first few weeks, during which its edges were cicatrizing, had not prevented him from following the active life of a soldier and engaging in other battles, in some of which he has been again wounded. He wears a leather strap over the fistula, and without this can neither swallow, articulate, or cough. When it is removed, he breathes through this large aperture only, and a good opportunity is then afforded of observing the position and play of important parts in life and robust health, as that of the velum and arches of the palate, the epiglottis, glottis, larynx, &c. No attempt appears to have been made to cure the deformity.

*Bronchial Calculus.*—Dr. S. C. G. Tice describes, (*Medico-Chirurgical Trans.*, vol. XXVI., London, 1843, 8vo.) an interesting case of bronchial calculus, the symptoms of which were pain in the right side, increased by pressure over the liver, dyspnoea: finally, suffocating paroxysms of cough on lying down, great fetor of breath, ending, after a continuance of six weeks, in laryngitis and sudden death. There was nothing before this event to indicate the true nature of the disease. On examining the body, an abscess, of the size of a pullet's egg, was found in a mass of enlarged bronchial glands at the bifurcation of the trachea. It opened into both bronchi, and into the oesophagus, and contained a quantity of *calcareous matter*, some of which was hard and some of soft consistence. A hard triangular portion was firmly wedged in the aperture, communicating with the right bronchus. This was found to consist of phosphate of lime. (See also *British and Foreign Med. Rev.*, vol. XVIII., July—October, 1844, p. 365.) [T.]

## ARTICLE II.—CATHETERISM OF THE LARYNX.

Catheterism of the larynx, whether in new-born infants or at any other epoch of life, is too simple an operation to require to be described more in detail. While with one hand the instrument is con-

ducted through the nose, or what is better, through the mouth, some of the fingers of the other hand, directed upon the lower part of the throat, secure its extremity, bring it into the glottis and prevent its passing into the oesophagus.

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## CHAPTER IV.

### ALIMENTARY PASSAGES.

#### ARTICLE I.—CATHETERISM OF THE OESOPHAGUS.

Various kinds of affections may render it necessary to have recourse to catheterism of the oesophagus. It is employed either as an exploring, extracting or propulsing remedy; it becomes an indispensable operation when we have to penetrate into the stomach to give relief in cases of certain poisons, or to force into this organ artificially, either aliments or medicated substances, and it may be of some advantage also in the treatment of certain diseases of the oesophagus itself. Its manual is easy and within the capacity of any one. It may be accomplished through the nose as well as by the mouth, by means of metallic instruments properly curved, and especially with flexible rods, such as canulas, gum-elastic bougies, whalebone, &c.

#### § I.—*Through the Nose.*

The first method, or that which consists in entering through the nasal fossæ, and which was adopted for a long time as the preferable one, is at the present day almost entirely abandoned. Being frequently difficult, and always fatiguing to the patient, it should be reserved only as an exceptional method. If the catheter is inflexible (fixe) its curvature will scarcely allow it to go beyond the apex of the pharyngeal cavity, and consequently to penetrate into the oesophagus. If it is flexible and straight, it buts against the vertebral wall of the posterior fauces, in such manner as to make it sometimes difficult to disengage it. This route however is better than none, should the other not be practicable. The sound, held in the right hand as a writing pen, is introduced through the nares in the same manner and with the same precautions as for catheterism of the Eustachian tube, except that the concavity of its beak, in place of being turned outwards or inwards, is rather to be directed downwards. By means of the forefinger or a blunt hook glided into the mouth, the operator endeavors to reach its extremity as soon as it arrives in the upper part of the pharynx; depresses it a little with the left hand, while with the right he continues to push it forward; in this manner directs its point into the axis of the oesophagus, while avoiding with care the entrance of the larynx or making too much friction on the parts; penetrates and advances by degrees; stops upon encountering the slightest difficulty; changes a little the direction of the force applied; withdraws

the instrument slightly in order to push it in again in another direction, if he meets with any resistance, and descends to a greater or less depth according to the indication he proposes to fulfill. Upon the supposition that a straight elastic catheter should have occasioned some embarrassment, nothing would be more easy than to remedy this inconvenience ; it should be passed down to a line with the glottis by means of a curved stilette, which should then be withdrawn, leaving the catheter in and proceeding in such manner for the rest of the operation as above described.

### § II.—*By the Mouth.*

Whatever may be the mode adopted, the patient being seated on a chair, is to be supported as in all other operations which are performed upon the face. When he enters by the mouth the surgeon gently depresses the tongue with the left forefinger, which he introduces, if possible, as far down as to the epiglottis, in order to protect him against the deviations of the instrument in the direction of the respiratory passages, then causes the sound or catheter to glide along the radial border of this finger while following the dorsal surface of the tongue ; enters without difficulty into the œsophagus if it presents the slightest curvature ; secures its extremity with the finger in the contrary case in order to compel it to follow the axis of this canal, and finally forces it to take such course as he judges most suitable.

When circumstances require that it should be kept in its place after the operation, it is to be inclined to one side in the interval left between some of the teeth, should any have been extracted, in order that we may adjust it at one of the labial commissures, by means of a ribbon which is to be fastened moreover around the head. Though it has been introduced by the mouth, should its presence cause too much fatigue to this cavity, nothing would prevent us, as has been remarked by Boyer, from bringing its outer extremity through the nose and thus changing the organ. All that would be required for this purpose, when it is once placed, would be to secure it by means of Bellocq's sound or any flexible bougie whatever, introduced through the nose, and to make traction upon it by means of a thread previously fastened to its extremity, in the same manner as would be done in tamponing the nasal fossæ. Unless the œsophagus should be deviated, contracted or abnormal, its catheterism is in general very simple. We should incur no risk of wounding its walls, making a false passage or blundering, in a word, or perforating it, as happened to the surgeon mentioned by Chas. Bell, unless we should proceed with extreme imprudence or use a degree of force that no instructed surgeon would attempt to employ. The finger being charged to guide the catheter as far down as to beyond the epiglottis, there can be no difficulty in ascertaining whether it has not accidentally descended into the larynx, as appears to have happened in the case mentioned by Worbe. Presenting a light at the orifice of the instrument, or the impossibility almost of its penetrating lower down than on a line with the bronchi, or better still, the injection of a few drops of liquid, which in that event would not fail to bring on cough, &c., would moreover soon assure us of the fact.

## § III.

The presence of an instrument in the oesophagus is not supported with ease by all persons. In some it produces a desire to vomit, a considerable degree of acute irritation and sometimes even fever. If still more serious accidents result from it; however useful it may be, it is to be withdrawn to be introduced subsequently, should there be occasion for it. One of its most serious inconveniences, though authors have scarcely made mention of it, consists in my opinion in this, that either by its beak or the convexity which we have forced it to take, it necessarily makes a greater pressure upon some points of the posterior wall than upon any of the others. This pressure, however slight it may appear to be, being uninterrupted, is calculated to cause at first a purulent exudation, then an ulceration or eschar, and finally a perforation. It would be difficult to call in question the possibility of such dangers, when we know that they have been produced in more than one instance by the extremity of a simple gum-elastic sound acting on the rectal wall of the urinary bladder. I strongly apprehend moreover, that the patient, whose oesophagus was found destroyed to the extent of at least two inches at an inch and a half above its passage through the diaphragm, and who had been treated by means of dilating sounds with apparent success, by M. Carrier, was in truth the victim of such an accident.

## ARTICLE II.—CONTRACTION OF THE OESOPHAGUS.

Since Mauchart has demonstrated the analogy which exists between the coarctations of the urethra and those of almost all the mucous canals, surgeons have endeavored at different times to apply to the contractions of the oesophagus, most of those remedies which have been found useful against those of the excretory duct of the urine. Mechanical dilatation was one of the first which was ventured upon. Recommended by Richerand and Dupuytren; made trial of on one occasion by MM. Carrier and Jallon, in a merchant of Orleans, who got along very well with it for more than a month, but ultimately perished from a destructive ulcer in the oesophagus; employed by Boyer, in the year 1797, in a woman who experienced but slight advantages from it, and by M. Sanson on a patient who, after having obtained much benefit from it, was desirous of leaving the Hotel Dieu, and considered it no longer necessary to continue under treatment; it appears to have been attended with a completely successful result in a case of Migliavacca, cited by Paletta; in another of E. Home; a third of M. Earle; a fourth of M. McIlvaine, and a fifth of M. Denis, (*Journ. Hebdom.*, 1835, t. II., p. 5.) Catheterism is the process used. The bougies, whether emplastic, elastic or conical rather than cylindrical, or better still, hollow sounds denominated *œsophagean*, used in such manner that their size may be gradually augmented, should be manipulated in these cases with the same caution and prudence as when used in the urethra. But the canal being larger or being intended to receive greater dimensions, the size that we are soon obliged to give to these instruments has placed us under the necessity of substituting other contrivances for them.

A contraction produced by an abscess which had left an œsophago-tracheal fistula, was cured by M. Gendron, (*Ibid.*, 1836, t., I. p. 378,) by means of a dilating sound sprinkled with alum. The author upon the strength of this fact and another, which was communicated to him by M. H. Bérard, (*Journ. des Conn. Med-Chir.*, Nov. 1837, p. 175, 187,) proceeds to lay it down that contractions of the œsophagus ought to be treated, and may be cured by catheterism. The instrument of M. Fletcher is curved and slender, and of metal, and consists of three branches, which a central rod provided with a head enables us to approximate or separate at pleasure. After having introduced it like an ordinary catheter, beyond the point of coarctation, it suffices to cause its movable axis to ascend, to enable the surgeon to separate its branches gradually to the extent that he may judge desirable. However ingenious this instrument may appear, it ought to be rejected. It is by means of a uniform pressure, and not at three points only of the contracted periphery, that dilatation can offer any prospect of success. It is necessary before all other things, that this indication should be perfectly fulfilled, but M. Fletcher appears to have entirely overlooked it. The air dilatator of M. Arnott, or the flexible and sheathed meche-holder contrived by M. Costallat, in order to reach deep-seated coarctations of the rectum, and especially of the urethra, would have a decided preference over it. Many surgeons also have turned their attention towards cauterization. Though among us this mode of treatment has been rarely made trial of, and that Boyer has thought proper formally to proscribe it, it is not however the same in other countries. M. Mondière, (*Arch. Gén. de Méd.*, 2nd ser., t. I., p. 465, t. II., p. 504, t. III., p. 28,) in fact shows that in Italy, England, and America, it has been several times had recourse to. A flexible rod, wrapped in linen saturated with liquid caustic was introduced by Paletta as far down as to the stricture, and the patient who died some weeks after found himself at first relieved by it. E. Home properly rejecting every substance of a fluid character, preferred nitrate of silver, and used it in seven instances. Four of his patients were cured, and the three others died from the natural progress of their disease. Out of three cases published by M. Andrews, one only succeeded. In the two others the treatment could not be continued. Finally, MM. C. Bell and MacIlvaine also declared themselves its partisans as Darwin had previously done, and appear to have made use only of nitrate of silver. A difficulty which first causes us to hesitate, is that of ascertaining the nature of the contraction which is to be overcome. Those only which arise from chronic phlegmasia, or an induration or lardaceous transformation of the mucous tunic or suprajacent membrane, admit of the employment of cauterization; but how are these to be distinguished from lesions which may be produced by tumors, cancerous or fungous degenerescences, ulcers of all kinds, aneurisms, polypi, &c.? The urethra being, so to speak, liable only to the first, incurs the risk of no embarrassment of this kind. Its small diameter, superficial situation, and the arrangement of its walls moreover, renders its mechanical dilatation an easy matter, and unattended almost with any danger. The œsophagus being surrounded with pliant tissues, and being itself exceedingly dilatable, is far from possessing the same advanta-

geous conditions under this point of view. By widening the contracted part, bougies scarcely do any more than to push outwardly the projection which was tending inwardly, and the disease returns almost as soon as the use of the instrument is suspended, making it therefore only a palliative treatment. As to the nitrate of silver, I would use it much less in its character as a caustic, than with the view of modifying the morbid condition of the parts; in this respect, the exactitude with which it is applied to this or that point in preference to another, is of less importance than is supposed. This, moreover, is a question which will be treated of under the head of diseases of the urethra.

[*Organic Stricture or Contraction of the Oesophagus.*—This distressing disease, which usually ends in a slow death by inanition or starvation, has naturally engaged much attention. M. Gendron furnishes one of the most interesting cases of cure of this disease, obtained by perseverance under every obstacle of the procéesses of alternate dilatation and cauterizations with alum and nitrate of silver; the dilatations being effected by the ordinary whalebone probang, made very flexible, with spherical sponges on their extremity of 6 to 7 centimeters in diameter, and the cauterization by the gum elastic canula with the wax border, to protect other parts than the structure itself from the action of this substance. The patient, a gentleman 33 years of age, had been for near two years the victim to distressing suffocating spasms in the throat and gullet, accompanied with still more annoying and prolonged attacks of eructation after taking his food. Finally, he could swallow nothing but soft-boiled meat, and *scarcely a drop of liquid*. The necessity of abstaining from nourishment soon wasted him away, and the thirst tormented him with agony. M. Gendron, (see *Arch. Gén. de Méd.*, 3e ser., t. XV., 1842, pp. 448, 457, also cases by the same author in the *Journ. des Connaiss. Médico-chirurgicales de Paris*, Nov. 1837,) by the probang, and especially by aiding this instrument with his fingers in the pharynx, whenever the sponge was stopped and the whalebone bent on encountering the impediment, succeeded in localizing the seat of this latter behind the first ring of the trachea. Meanwhile great relief was obtained by introducing any kinds of liquid food through the canulas used. The proof that duplicatures, as well as a firm bridle existed at the point, was shown by the greater difficulty of swallowing liquids, as these are caught by such folds in the lining membrane. The caustic brought away the debris of the abnormal obstruction, and the patient was after a long and resolute course of treatment by the instruments in question, restored to excellent health, enbompoint and cheerfulness, but still was under the necessity of persevering in the catheterism with the probang twice a week, to keep up the calibre of the passage to its normal dimensions. The flatulence, spasms, &c. were wholly removed. It is a singular feature of these circumscribed strictures, that they are unaccompanied with any defined pain in the part or vicinity. Though with most surgeons catheterism and cauterization of the oesophagus have been considered of late, to be more hazardous and injurious than useful, there can be no doubt, judging by the details given by M. Gendron, that much of the disrepute into which they have fallen has

arisen from the imperfect manner in which they have been performed; and that if practised as perseveringly and with as much apparent judgment, caution and tact as they were in the remarkable case in question by that surgeon, they will claim a yet higher reputation than they have hitherto reached, in a disease, which without some such surgical resource must necessarily end in a frightful death.

The œsophagus sometimes becomes preternaturally dilated, as in the case related by Dr. Lindau of Thorn, (*Casper's Wochenschrift*, 1840, No. 22,) in the form of a pouch occupying all its middle and posterior portion, and no less than four inches in diameter at its largest expansion, the whole of this sacculated diseased mass being adherent to the surrounding parts. Whether such pouches be the result, in the first place, of cancer, and then a constriction interrupting the food, and thence giving rise secondarily to dilatation from the efforts in deglutition; or whatever the cause may be, it will be found that one diagnostic mark will present itself after the dilatation is complete, which is the reverse of what we have seen in the case above. Thus, in dilatations it will be the *most liquid* kinds of food which will make their way most readily into the stomach, while the solid portions from the absence of propulsive power in the tube will continue to accumulate in the pouch. T.]

### ARTICLE III.—FOREIGN BODIES IN THE ŒSOPHAGUS.

A crust of bread, a piece of tripe, large mouthfuls of hard and tough meat or skin, a slice of fruit, a sugar-plum, a piece of mutton, cake, a slice of ham, an entire egg, a chesnut, pear, fig, and all other substances that may possess some solidity, and which belong to articles of food, or that are sometimes introduced into the mouth, may be arrested in the œsophagus and give rise to serious accidents. As these different bodies, however, are more or less soluble in the excretions of the digestive passages, it rarely happens that they do not ultimately descend into the stomach. Pebbles, pieces of glass, a fish or other small bone, a piece of money, a blade of a knife, a fork, and a thousand different modifications of foreign bodies, so many instances of which are contained in the memoirs of Hévin and Sue, are infinitely more dangerous, though the organism has in more than one instance got the better of them without any assistance. They lacerate or contuse the parts, produce inflammations, abscesses and frightful pains, which frequently end only in death. To the numerous facts which are already contained in authors, we could, without the slightest difficulty, add a multitude of others. MM. Gilbert and Corby, (*Arch. Gén. de Méd.*, t. XVII., p. 139,) Murat, Bard, &c., have also added many to the list, and practitioners daily encounter new instances. The aorta was in this manner perforated in the cases mentioned by MM. Laurencin and Léger or Martin, by a piece of six livres. It was the pulmonary artery in the patient of M. Berneust, and the trachea in the case of Dupuytren, (*Bégin, Journ. Hebd.*, t. II., pp. 93—124.) Routier, (*Bull. de la Fac.*, t. IV., p. 499,) speaks of a five franc piece which having become implanted in this manner, caused death at the expiration of a month. Dumortier has in this manner seen the presence of a piece of money arrested in the

cœsophagus cause a perforation of the primitive carotid artery. When it is evident that the presence of these foreign bodies may produce injury, and that the organism alone is incapable of relieving itself of them, three classes of resources may be had recourse to before proceeding to the section of the cœsophagus. They are to be pushed down into the stomach, or obliged to return by the natural passages, or we restrict ourselves to preventing, or combatting even with active means, the accidents they may give rise to should they already exist.

### § I.—*Propulsion.*

We should force into the stomach only those foreign bodies which would be attended with too much difficulty to extract by the mouth, but which having been once got out of the cœsophagus will be somewhat less dangerous to the patient. Water swallowed in large quantities, large mouthfuls of the crumb of bread, beef, biscuit, or figs turned inside out, prunes deprived of their pit, portions of sponge with a thread fastened to them, long bougies besmeared with oil, a leek, slight strokes upon the back with the fist, as recommended by De la Motte, and which common people rarely fail to have recourse to, together with I do not know how many other remedies, have been proposed and successively employed in practice with more or less decided advantage, and frequently also without any kind of benefit. In such cases the leaden rod of Albucasis and Rhazes, a ball of the same metal melted and attached to the extremity of a rod of iron, silver or brass, and which was so much eulogized by Mesnier, the silver rod of Verduc terminated in an olive point, and the curved sound, &c., are far also from being always attended with success. In all these I see only the stalk of the leek, which has been quite generally employed since the time of M. Paré, and the leaden ball, which are really worthy of any confidence. It will also be necessary that those two kinds of means should be supported by flexible rods capable of following without difficulty the tortuous shape of the mouth, pharynx and cœsophagus, while possessing at the same time a sufficient degree of solidity not to break during the operation.

### § II.—*Extraction.*

When we cannot reach the foreign bodies lodged in the pharynx or cœsophagus by means of the fingers, we must have recourse to a long forceps slightly curved, or for example to the urethral forceps of Ravaton, erroneously denominated Hunter's forceps. The species of tenaculum or hook of iron wire of Riviere, (Bonet, *Corps de Méd.*, t. IV., p. 150,) or Perrotin, incurs the risk of lacerating the tissues when it is withdrawn, as occurred to Petit of Nevers. Stedman, by terminating it with a button, has evidently improved this instrument, and Dupuytren, who replaces it by a long silver stem terminated in a ball at one end and a ring at the other, and who makes it an exploring instrument or species of catheter in straightening it, and a hook in curving it, has rendered it still more easy of management.

A. F. de Hilden's hook, in the form of a scraper, would be much more dangerous. That which Petit contrived, with a double flexible silver wire, turned into a spiral form, and curved towards its noose,

in the manner of Pellier's palpebral elevator, has no objection to it but its want of strength. The probe or whalebone having upon it a collection of small movable rings, which was extolled by the same practitioner, and which De la Faye modified by restricting himself to the use of strands of flax attached to the small ring of the common stilette of the catheter, is also not to be neglected, when the body to be extracted is irregular and of small size.

B. A noose of packthread or whipcord, which Mauchart found reason to be satisfied with;—1st, a sponge strongly bound with a thread, and introduced below the foreign body by means of a large leaden canula, at the end of which it is held, and drawing on the two extremities of the thread, which are brought, one through the canal and the other along the outer side of the instrument, as was done by Brouilliard; 2d, the same substance attached to the extremity of a whalebone, as Willis recommends, or of an ordinary catheter, or that leaden, or copper, or cribbled canula, borrowed from Arculanus or Ryff, and modified by Hilden, who, in order to render it stronger, added to it a leaden stylet; 3d, the sponge in addition, which Hévin recommends, should be surmounted by a purse of cannepin or silk, in order to prevent it from swelling before it had descended sufficiently low down, which Bonfils, (*Arch. Gén. de Méd.*, t. XXIII., p. 530,) as well as Petit, attaches to the extremity of a whalebone, inclosed as far up as to its handle in a flexible tube, made of silver wire, rolled in a spiral manner, and which Quesnay covered with sheep-gut, and Ollenroth hung to the extremity of a chain chaplet, composed of 61 balls of pewter, might also be applicable in certain cases; 4th, the same remark applies to the species of broom, whip, or brush, or *excutia ventriculi*, which had already been mentioned by Wedel, Teichmeyer, and Heister, and which the English, who call it *provendor*, form by attaching small portions of scraped linen, or a bunch of hog's bristles, at the extremity of a whalebone, or brass lateen or wire.

C. The manner of using these different instruments, whether for the purpose of forcing the bodies in question into the stomach or for extracting them, is moreover too easily comprehended to make it necessary to dwell any longer upon it. The same remark may be made of their relative value in the different cases where many of them may be advantageous. It is for the skillful surgeon to select which of them is best, the most simple, certain and least injurious among those which he has at command. The species of forceps with several branches, which is opened and closed by a particular mechanism, before and after having seized the foreign body, and which M. Missoux in his thesis in 1825 has described under the name *geranorhinque*, is, though ingenious, too complicated to be adopted. The crane-beak, designed for seizing the foreign body while another curved forceps widens the walls of the canal, employed by M. Gen-soul (*Journ. des Hôp. de Lyon*, t. I., p. 233) to extract a piece of cutlet, would be preferable. That which M. Blondeau (*Thèse*, No. 44, Paris, 1830) proposes, and which is founded on the principle of litholabes and enclosed in a flexible sheath, would be equally preferable if it was not already in itself too complex. The same must be said of the ingenious apparatus devised by M. Parant (*Trans. Méd.*).

t. VI., p. 72.) The small dilating blade of M. Doussault, (*Thèse*, No. 41, Paris, 1831,) and all those instruments which, after being introduced shut up, open themselves in the œsophagus in the manner of an umbrella, are too dangerous not to be replaced by the bladder that M. Oury (*Thèse*, No. 290, Paris, 1833) attaches to the end of a sound, and does not dilate until after it has been made to advance below the foreign body, should that have presented sufficient resistance to require it.

### § III.

*The efforts of expulsion and vomiting*, which many authors have advised, should be encouraged, notwithstanding the objections of B. Bell, whether they consist in titillating the uvula or the bottom of the throat, or in gorging the patient with warm water, or by any other mode, form a last resource, to which we ought not to resort except for bodies destitute of any asperities or projections, or until after having made use of the two kinds of modes above indicated, and in order only not to have occasion to reproach ourselves for having proceeded too hastily or without necessity to œsophagotomy.

## ARTICLE IV.—ŒSOPHAGOTOMY.

Though this operation may not have been formerly proposed by any person before Verduc and Guattani, it is impossible nevertheless not to perceive that the idea of it is found in several authors who are more ancient. The incision into an abscess containing a small bone which had escaped from the œsophagus and approximated to the integuments of the neck, which had already been performed by Arculanus and Plater; the fish bones extracted in the same manner by Houlier and Glandorp; and the opening into tumors more or less dense or voluminous, which had become developed upon the same region, as practised by Kerkring, Rivals, &c., would naturally lead to this operation. But wounds of the œsophagus had, up to that period, been considered so dangerous that practitioners required numerous facts and direct proofs to dissipate their fears and scruples.

### § I.

*The incision of the œsophagus*, performed for the first time by Goursault in 1738, and then by Roland, (*Acad. de Chir.*, t. III., p. 10, in 8vo, 1819,) is an operation which is applicable only to two descriptions of particular cases: 1st, when we wish to extract a foreign body which, by its presence in the œsophagus, compromises to a greater or lesser degree the life of the patient; 2d, to introduce artificially nutritive substances into the digestive passages, and to prolong to a greater or less length of time the life of those persons who are prevented from swallowing by means of a coarctation of the lower part of the pharynx. In the first case, before proceeding to œsophagotomy, we must make trial of every means in order to compel the foreign body to be ejected by the natural passages, unless it is of such a nature as to render it improper to force it towards the stomach without some danger. Since œsophagotomy has taken

rank among the systematized operations of surgery, it has received, like almost all the others, various degrees of improvement. Guattani, who was not unaware that the œsophagus is situated a little more to the left than to the right of the trachea, advises that we should take up a transverse fold of the skin and incise it from a line with the cricoid cartilage as far down as to the sternum and upon the left side of the neck; separate the lips of the wound by means of hooks; and arrive gradually to the œsophagus, and divide it in a direction parallel with its fibres. According to B. Bell there can be no settled place for the incision, as it should always be performed upon the projection which is made by the foreign body. He knew moreover that with certain precautions the recurrent nerve could easily be avoided.

To be more certain of dividing no vessel of any size, Richter recommends that the muscles should be separated by means of an ivory knife. The method of Eckholdt, extolled for what reason I do not know, by Sprengel, and which consists in making the external incision fall upon the triangular space which separates the two roots of the sterno-mastoid muscle, appears to me to deserve the oblivion into which it has sunk. I would make the same remark of that of V. Gescher, (*Rust's Handbuch der Chir.*, t. XII., p. 281,) who recommends that we should traverse the trachea to reach the œsophagus from before backwards. M. Chas. Bell says, that if we place the thumb on the track of the internal jugular vein, in order to cause it to distend while we are incising the skin, the platysma-myoides and nervous branches of the cervical plexus, and that if we separate the muscles apart by means of the handle of a scalpel, the œsophagus will soon present itself, so to speak, of its own accord, and that in this manner, œsophagotomy is not dangerous; but this author is evidently mistaken in regard to the importance of a precaution of this kind. M. Richerand, who only admits of œsophagotomy in cases where the size of the foreign body is so considerable as to make a protrusion beyond the surrounding parts, and who justly maintains that it is almost always at the entrance of the canal of deglutition that these bodies become arrested, adopts, in every particular, the process of Guattani or B. Bell. In this hypothesis, in fact, the external projection is a guide which directs with certainty to the œsophagus, and which favors the pushing aside of all those organs which it is important should be avoided. An instrument which was devised by Vacca enables us to effect the same object in all cases. It is a long metallic stem, terminated in a button, and cleft in the form of forceps at one of its extremities. This stem slides in a canula, which has a large opening upon one of its sides at some inches beyond its extremity. The complete instrument is introduced, shut up, until it reaches to below the foreign body. The surgeon then draws gently towards him the forceps, one of the branches of which, acted upon by its own elasticity, does not fail to get caught in the lateral hole of the canula, which served it as a sheath, and thus raises upon the side of the neck the different layers which are to be divided. But the dart-shaped sound is infinitely more convenient still than the instrument of Vacca, if it be that we require a director when we perform œsophagotomy. In raising up all the soft parts to the left, and in front, by means of the beak of a sound, previously introduced

nearly down to the body to be extracted, as proposed by M. Roux, the carotid artery, jugular vein, and pneumo-gastric nerve are necessarily left posteriorly. The thyroid vessels themselves, and the trachea, are also sufficiently distant to prevent any danger in pushing his dart-shaped instrument from within outwards, and from making use of it afterwards in the manner of a canulated sound, as in lithotomy. Nevertheless it is unnecessary to proceed in this manner blindfolded. Nothing prevents our dividing at first, layer by layer, the different tissues which separate the œsophagus from the integuments, and not making use of the sound except in the last stage of the operation. By this process œsophagotomy has no longer anything alarming in it, or difficult, and may be performed by every surgeon. If it were necessary, in fact, there would be no objection in substituting an ordinary sound for that of F. Côme.

### § II.—*Operative Process.*

The patient is placed in the same way as for tracheotomy, except that we incline his face a little towards the right. The surgeon, standing up, and to the left, divides with a straight bistoury the integuments and platysma-myoides, to the extent of two or three inches, upon the anterior border of the sterno-mastoid muscle, between the sternum and the larynx, and as much as possible immediately opposite to the foreign body, the position of which he has previously ascertained, by means of the blunt-pointed sound of Dupuytren, the dart sound, or any other instrument. Afterwards pushing this muscle towards the outside, he lays bare the omo-hyoïd and sterno-hyoïdeus; pushes them aside in their turn; tears, by means of the beak of a canulated sound, or cautiously divides with the bistoury the fibro-cellular layers, in the same way as if he were applying a ligature to the primitive carotid artery; then raises up and pushes inwards and forwards the thyroid body. Adopting the same precautions until he comes down to the groove, which is situated laterally between the œsophagus and trachea, he there encounters the inferior laryngeal nerve.

Having introduced his dart sound through the mouth, he causes its point to pass through the œsophagus, as far down as to the bottom of the wound; secures it with the thumb and left forefinger; requests an assistant to push forward its arrow; directs the point of his bistoury upon the grooved concavity of this stem, and immediately makes an incision into the œsophagus, proportionate to the size of the body to be extracted. When we do not employ a director, we must first open into the canal on its side by a small puncture, which enables us immediately to introduce a canulated sound into its interior, and afterwards to enlarge its wound by means of a bistoury or blunt-pointed scissors. If the substance to be removed does not present itself at the opening which has just been made, we must proceed to search for it by means of forceps or any other appropriate instrument. The wound may be united by first intention. If an arterial branch of some size has been wounded, a ligature is to be applied to it. A gum-elastic catheter must be introduced through the nares or mouth, as far down as into the stomach, and not be withdrawn from it before

the third or fourth day, in order that the aliments and drinks may not in any manner interfere with the agglutination of the wound of the œsophagus, or escape into the tissues of the infra-hyoïd region. If œsophogotomy, performed on the thirtieth day by M. Arnott, (*Gaz. Méd.*, 1834, p. 45—*Med. Chir. Rev.*, July, 1833, p. 240,) to extract a portion of the vertebra of a sheep, caused the death of the patient at the expiration of three days, two patients that were operated upon after these precepts at the Val-de-Grâce by M. Bégin, (*Journ. Hebd.*, t. XI., pp. 94, 111, 124,) one on the eleventh day, and the other on the sixth, in order to extract a piece of bone, were perfectly restored.

### § III.

*The anomaly* pointed out by MM. Steadman, Kirby, Hart, Gode-man, and Robert, as well as by myself, of a carotid or subclavian passing around the œsophagus in the manner of a spiral, or gliding under its vertebral surface in order to reach the side of the neck, would not expose to any dangers unless the operation should be performed very low down.

[An iron-cellular key four inches long and one in breadth at either extremity, got lodged in the upper part of the œsophagus, and there remained for the space of 58 days, giving rise to the supposition only of a protracted tracheo-bronchitis, wasting away the strength, and not materially interfering with the swallowing even of hard solid food. This occurred in the case of a woman aged 42, described by Dr. R. Jackson of Leith, (*Edinb. Med. and Surg. Journ.*, July, 1843,) the woman having designedly swallowed the key to destroy herself, yet persisting in denying it to her death. The block of the key was found resting close to the epiglottis and on the hyoid bone, the shank of the key and ring lying downwards in the œsophagus, the ring having caught in a fold of the lining membrane of this tube, and which fold constituted a sac for it. Some thickening of the tube was apparent, and a few slight ulcerations. Death was here caused by irritation of the air-passages, not by dysphagia.]

Dr. Antony of Philadelphia, (*Philadelphia Med. Examiner*, April, 1845,) ingeniously removed a fish-hook lodged in the gullet, (and which a boy had mischievously dropped with its line into the throat of an old lady while she was asleep,) by saving a portion of the line, and passing down by this means upon the hook a bullet drilled through the middle. Then passing down upon this bullet by means of the same string a hollow reed, the hook and bullet were withdrawn through the reed without any injury to the parts.

*Foreign Bodies in the Integuments, Eye, &c.*—Dr. Bachelder of this city, (see Collins's *New York Medical and Surgical Reporter*. June 27, 1846, p. 303, &c.,) in cases of needles, &c. in the palms of the hands and soles of the feet, operates with great success in the following manner :

“The operation to which I allude, and which, as I have said before and now repeat with emphasis, I have practised with uniform success, is to make two incisions, which commence in a point a little distance, say a quarter of an inch, from the place where the needle

entered, and diverging on either side of the place of entry, and dissect up the triangular flap, whose base and sides should be about five-eighths of an inch long. It is best that the point whence they diverge should be longitudinally in a line with the place of entry, and on the proximal or distal side of it, according to the supposed direction in which the needle entered or lies. These incisions, which should of course correspond as nearly as circumstances will admit, with the longitudinal direction of the member, may be carried down to the palmar or plantar aponeurosis, and indeed through either if necessary, with safety; for the blood-vessels and nerves lie beneath those membranes: and the dread of wounding the fibrous tissues of these parts has long since ceased to haunt the imagination of the surgeon. As the resistance of those aponeuroses causes the fracture of the needle in most instances, to happen just exterior to them, you will generally need only to dissect and turn back the triangular flap of integument, and then if requisite, remove with the dissecting forceps and scissors the cellular substance which intervenes between it and the aponeurosis, in order to feel and extract the foreign body with the fingers or forceps. If you do not succeed, the aponeurosis itself may be treated in the same manner as the tegumentary covering.

"As needles and pins have remained many years in the system—have travelled in all directions, and been found in almost every part except the brain, without having caused much harm or serious inconvenience, the question might be asked whether it is best to interfere at all, or let them remain and take their own course; to this interrogatory I would reply, that I have also known many cases in which they were productive of very serious mischief, by undermining the general health, and nearly, if not quite depriving the patient of the use of the limb; therefore always remove them in the first instance if practicable."

M. Castelnau (*Arch. Gén.*, 3e ser., t. XV., p. 210, &c.) relates the extraordinary case of a man, who for three years and a half retained a sharp, triangular fragment of iron, 13 millimetres in length, in the globe of the eye, without producing any other effects than severe pains in the organ, but not until two years after the injury occurred. It then made its way, but *without any suppuration*, to the cornea, where it occasioned intense conjunctivitis. It was readily extracted, when the accidents immediately ceased. The absence of the suppurative process noticed by M. Velpeau in the text, as the usual consequence of metallic fragments in the globe, is, when taken into connection with the unprecedented size of the foreign body, and its comparative innocuousness for so long a period, a remarkable feature in this case. T.]

## PART THIRD.

## THE CHEST.

## CHAPTER I.

## TUMORS.

## ARTICLE I.—TUMORS AND EXTRIPATION OF THE BREAST.

§ I.—*Indications.*

A. *Compression*, employed from 1809 to 1816 by Yonge, rejected as dangerous in 1817 by the physicians of Middlesex, upon the report of Chas. Bell, and proposed at a subsequent period by Pearson, has since afforded to M. Récamier results which this practitioner considers worthy of attracting attention in treatment of tumors of the breast. Nevertheless this is not a reason for rejecting the operation properly so called, or for not recurring to it but as an extreme measure as some people seem to think. Many women cannot support compression, however well it may be made. A great number of cases obstinately resist its application, and nothing proves that it has ever *cured* a *true* cancer. Under the most fortunate circumstances, the assiduous cares that it exacts are so fatiguing in themselves, as to have given rise to the question, if extirpation be not preferable to it. It is not, in fact, as an operation, that extirpation of the breast is dangerous, but because it is frequently followed by a return. The amount of pain that it produces is assuredly less than that which results from a course of treatment whose duration cannot be less than from two to three months. In an instant the patient is relieved of her disease, and fifteen days or a month ordinarily suffice to effect a complete cure. On the other hand there is no reason for maintaining that the return would be less frequent after the employment of the compressing bandage, than after the ablation of the scirrhus. Experience has already shown that when it becomes necessary to suspend the compression, before having entirely dispersed the morbid mass, the progress of the cancer soon goes on with an increased rapidity, in such manner that its development, though momentarily arrested, soon assumes a more frightful character than ever.

B. As to the question whether *extirpation* is a *remedy* which sound practice ought to allow us to make trial of, I do not hesitate to answer in the affirmative. To Celsus, (Sprengel, t. VIII., trad. Franc., p. 422; Celsus, liv. V., chap. xviii., sect. 2,) who forbids the cancer from being meddled with, because it always returns; to Albucasis, (*Chir.*, lib. II., s. 53; Sprengel, VIII., 487,) who has never seen the operation followed by entire success; to Monro, (Sprengel, VIII., 457,) who says that out of more than sixty women whom he had met with, after this operation, four only had not had a return at the expiration of two years; to Boyer, also, (*Mal. Chir.*, t. VII., p.

237,) who, out of more than one hundred cases, could cite only a very small number of radical cures ; to Rouzet, (*Rech. et Obs. sur le Cancer*, 1829,) who asserts that he has found in the annals of science but very equivocal evidence of permanent success ; and to M. McFarlane, who, out of one hundred cases, has not seen one effectual cure ; we may oppose the evidence of Hill, (*Cases in Surgery*, Edinburgh, 1772,) who, out of eighty-eight extirpations, most of which were ulcerated, has met with but twelve failures ; that of Schmucker, (*Bibliot. Chir. du Nord*, p. 296,) who operated at the beginning of the disease ; that of B. Bell, who confirms the accuracy of Dr. Hill ; and that of Dr. North, quoted by Dorsey, (*Elements of Surg., &c.*, vol. II., p. 4,) and who, out of one hundred examples, noticed but a very small proportion of a return of the disease. MM. Richerand, Roux and Dupuytren, and before them Sabatier, on their part, had evidence that cancer is far from repullulating always, when the extirpation has been made in time. My experience also shows that many patients operated upon at Tours by M. Gouraud, at the hospital of St. Louis by M. J. Cloquet, and at the hospital of the School of Medicine by MM. Bougon and Roux or myself, since the last 12, 8, 6, 4 and 2 years, continue to enjoy good health.

C. *Cancer of the breast is not the external sign of a general disease*, as Delpech maintains, at least in most cases, except at quite an advanced period of its development. In the majority of cases, it is at first only a local affection, but one which tends constantly to pervert the fluids and solids to such extent as to be soon reproduced on one region or another, although it may have been entirely destroyed at the part where it appeared to be situated.

Consequently nothing can be more dangerous than to shrink from its ablation under idle pretexts ; and compression, which is necessarily less efficacious, would not be proper to be had recourse to, except in timid persons, or such as from any cause whatever were not willing to submit to the action of the bistoury. If general and local treatment possess any value, the operation, which is in no respect incompatible with their employment, cannot but favor their success. We should be wrong even to allow ourselves to be deceived by the presence of certain glands at the hollow of the axilla or in the supra-clavicular region. These glands may have preceded the scirrhus, or been produced by it without participating in its character. Bartholin, Borrich, Assalini and Desault, (*Sprengel, Hist. de la Méd.*, t. VIII., pp. 439, 440,) have seen them disappear spontaneously after extirpation of the cancerous breast. The same fact has been frequently noticed in these latter times. This result took place in 1825, in a woman operated upon by M. Roux, at the Hospital of Perfectionnement, and who had a chaplet of indurated glands extending from the side of the neck down into the hollow of the axilla. Nor does a slight yellowish tint, or the commencement of what is called the cancerous diathesis, always form an absolute counter-indication. Morgagni, having to treat a patient in this condition, ventured to extirpate in spite of the formal advice of Valsalva. The cancer returned at the end of five years; Morgagni again operated and the disease was not reproduced. The adhesions of the tumor to the ribs considerably diminish the chances of success, but do not render it absolutely imposs-

ble. The operation therefore should be performed in all cases where the last roots of the disease may be extirpated without occasioning too great a loss of substance, and where there is no evidence to show that it exists in the other organs.

### § II.—*Operative Processes.*

It is to the barbarous processes used at different epochs by various surgeons, that we must look for an explanation, if the removal of the breast still occasions so much alarm to people in general.

A. Cauterization of the wound with the iron heated to a moderate red heat, already mentioned in the writings of Galen; the precept of Leonidas, (*Aetius*, tetr. 4, serm. 4, cap. 43; *Sprengel*, 8, 423,) to burn after each cut of the bistoury the bottom of the wound in order to prevent hemorrhage; or excision with the knife heated to a white heat, or when the cancer is adherent, by means of a blade of horn which has been dipped in aqua fortis, as prescribed by J. Fabricius, (*Op. Chir.*, p. 1, cap. 49; *Op.*, 193; *Sprengel*, 8, 436,) must necessarily have been attended with excruciating pain. The process of Sculetus, (*Armam.*, p. I., p. 22, tab. 24, 36; *Sprengel*, 8, 441,) which consisted in introducing two threads crosswise through the tumor, in order to raise it up and excise it with a single cut of a large concave bistoury, and then to cauterize the entire bleeding surface with a plate of red hot iron; that of Purmann, (*Chir. &c.*, t. II., chap. 6, p. 144; *Sprengel*, 8, 444,) who added to these threads a ligature strongly tightened upon the root of the disease with the view of benumbing the parts; those of Nuck, (*Obs. et Exper. Chir.*, p. 101; *Sprengel*, 8, 445,) who used a double hook and a falciform knife; of Dionis, (*Oper. de Chir.*, demonst. XI., fig. 28,) who commenced by plunging into the cancerous mass those famous *Helvetian forceps* of which so much was said at the commencement of the last century; of Hartmann, (*Barbeu, Thèse de Haller*, t. I.,) and Vylhorne, (*De Cancro. Mam.*, &c.; *Haller*, 2, 449; *Sprengel*, 8, 453,) who after having strangulated the schirrus at its base, secured it still farther by means of a sort of *veterinary pincers*, (moraille,) and then with the bident of Helvetius, while its excision was effected by a mechanical instrument of their invention; and of Schmucker, (*Chir. &c.*, lib. II., p. 51; *Sprengel*, 8, 471,) who after having laid open the skin pressed the tumor in order to make it protrude, introduced into it a species of awl slightly curved, and then separated it from the surrounding parts; were also well calculated to create such apprehensions.

B. Those who caused the separation of the tumor by surrounding it with a ligature saturated with aqua fortis, or who having entirely or partially excised it in one way or another, made use of the repeated applications of arsenic, orpiment, potash, butter of antimony, &c.; and those who cautiously dissected all the surrounding vessels, in order to place a double ligature on each of them, and to divide them without danger in the interspace of the two threads before removing the cancer, or who after the incision of the integuments made use only of their fingers, and terminated the operation by tear-

ing out the tumor, presented no arguments for changing public opinion upon this subject.

C. At the present day, when *extirpation of the breast* is reduced to its greatest simplicity, there is nothing in it which is alarming or in reality severe.

I. *When the skin is in no respect diseased*, nor the tumor of a large size or adherent, the surgeon confines himself to dividing the common integuments, taking care to give to the incision all the extent required, and to cause its lips to be separated apart, while with an erigene, or even with the ends of his fingers, he draws the scirrhus to the exterior, and with the other hand armed with a bistoury, destroys all its cellular or vascular attachments. When the patient possesses a certain degree of embonpoint, or that the breasts are naturally greatly developed, though the carcinoma may be clearly circumscribed and preserve all its mobility, there is some advantage in not being so sparing of the skin, and in excising even an ellipse from it of greater or lesser extent. The operation is thus rendered more easy and more prompt. Its success also then becomes more probable, for the lips of the wound, which are then moreover cut almost in a uniform manner, are placed under more favorable conditions for exact coaptation, than if all the integuments had been preserved.

II. *If the skin itself is comprised* in the disorganization, or red, or too attenuated ever to acquire its primitive characters; or if it adheres by its deep-seated surface to the morbid mass, we are still compelled to adopt the same precept, and to include the entire diseased portion between two incisions, which should always embrace a certain extent of sound parts, that is, between two semilunar incisions, as recommended by Zeller and Kern, (*Rust. Handb. de Chir.*, vol. VI.) In conclusion, it is much better to remove more than less, provided we leave enough to allow of reunion of the wound by first intention. The circular incision adopted by the ancients, and also by Dionis, is essentially objectionable. It makes a wound which is difficult of cicatrization, and the loss of substance which it produces is much more considerable than by any other mode. It can be applicable only to globular tumors, which are as it were confounded with the skin upon their anterior surface. - It would be under such circumstances, that we might, after the example of M. Fardeau, (*Journ. Hebdo.*, 1835, t. IV., p. 110.) by means of a knife introduced through the tissues between them and the chest, detach the tumor first above and then below. The elliptical incision which was already used by Paul of Egina, (Sprengel, t. VIII., p. 425,) and afterwards by Cheselden, (*Observ.*, &c., 1749; Sprengel, t. VIII., p. 452,) &c., is the most convenient of all. The crucial incision preferred by Palfin (Sprengel, t. VIII., p. 450,) and Heister, (*Institut. Chir.*, Sprengel, t. VIII., p. 451;) and the T incision employed by Acrel, and even by Chopart, (Sprengel, t. VIII., p. 475,) evidently possesses fewer advantages, and would be applicable only in certain particular cases.

D. Some with Gahrliep and M. C. Bell, place the great *diameter of this incision* from above downwards; others prefer that it should be transverse; while the precept of Pimpernelle, recommended according to Sprengel by Verduc, and which consists in placing it obliquely from above downwards, and from without inwards; that is

to say, in the direction of the fibres of the pectoralis major, is generally adopted by the moderns. The advantage of being enabled to apply the uniting means with more facility in the first case, is more than counterbalanced by the risk of dividing the muscular fibres perpendicularly, and of not being enabled to bring to the outside the sternal portion of the integuments but with much difficulty. The second process would incur the risk of the same inconveniences, without which enables us to employ the adhesive straps, as well as any other presenting the same advantages. Consequently the oblique incision, process, and which leaves intact the fibres of the pectoralis major, deserves the preference which is now accorded to it.

E. In a case of necessity, all *cutting instruments* are *applicable* to this operation. We could, if so disposed, succeed with a razor or amputating knife. The bistoury, with a broad and square-shaped point, devised by A. Dubois with a view of avoiding the chest with greater certainty, is neither better nor worse than any other. The ordinary straight bistoury, or better still the convex, is the one which is usually employed. In order that the blood of the first incision may not interfere with the execution of the second, we begin in conformity with the indication laid down by Palfin, and afterwards by Desault, by the lowest. Nevertheless, when the section of the integuments has been once effected, there is some advantage in dissecting the tumor from above downwards. In the opposite direction the lower or outer border of the pectoralis major would be much more exposed to the action of the bistoury. No one moreover at the present day recommends with Horne, (Sprengel, *Hist. de la Méd.*, t. VIII., p. 440,) Lapeyronie. (*Ibid.*, 463,) and Le Dran, (*Opérations*, p. 375,) that we should commence by a semilunar incision, and not complete the ellipse which is to represent the wound until after having detached the cancer always in the same direction, or, terminate by dividing the skin from the deep-seated parts towards the exterior, as recommended by M. Galenzowski. This manner of proceeding however has no other defect than that of giving less regularity to the termination of the operation, and of incurring the risk of destroying too great or too small an extent of the cutaneous tissue.

F. When the loss of substance is considerable, and to so great an extent as to render the coaptation of the borders of the division impossible, or at least very difficult, it has been proposed to isolate each lip of the wound from the subjacent parts, to the distance of one or several inches, hoping by that means to remove all the obstacles which are opposed to their approximation. This is a modification, the value of which, in my opinion, has not hitherto been fully appreciated. By means of this process we should always have a sufficiency of skin to unite the wound by first intention; the integuments are then borrowed from the surrounding parts, and the process must always be a precious resource in cases where we have been compelled to destroy a large portion of the cutaneous envelope. Under the chapter on anaplasty, I have stated what value ought to be placed under such circumstances upon the different descriptions of autoplasty, and especially of the process that M. Martinet (*Gaz. Méd.*, 1834, p. 657) appears to have employed.

G. The small arteries that are divided belong to the external

mammary, the superior thoracic, the internal mammary or the intercostal arteries. Those that we meet of the largest size, and which we must first attend to, are always towards the outside. In placing a ligature upon them in proportion as we divide them, there is no danger that they will retract and escape into the midst of the tissues, nor that the action of the air will prevent our finding them again subsequently; but the operation in this way becomes more laborious and protracted. Unless they should be too numerous or very large, I prefer making use of the fingers of an assistant to close their orifices at the moment that they are divided by the bistoury. Should there be any which cannot be found after having cleansed the wound, they are generally too small to occasion the slightest inquietude. In the contrary case, it would be so easy to establish upon them a point for indirect or direct compression, that in this respect we have in reality but little to apprehend. Even when we unite by first intention, ligatures are far from being always indispensable. Theden did not make use of them; and Petit ordinarily dispensed with them. D'Arce and Vanhorne, who also omitted them, tore out the tumor with the fingers, and only used the bistoury for dividing the integuments. I have frequently dispensed with them, and among other cases, in that of a young woman in whom I had removed a scirrhouss mass as large as the fist. Prudence, however, requires that we should tie or twist all those which may be recognized; and that if there be any that escape the researches of the surgeon, the dressing should be carefully watched during the space of a day or two.

H. The precaution of not *definitively dressing the wound* until after the expiration of some hours, in order to give time for the centrifugal action of the vascular system to become established, and to make manifest the arterial mouths which are to be closed, would possess the serious inconvenience of worrying and tormenting many patients, and of being at the least unnecessary. At the present day it would be absurd and barbarous to dissect, as has been recommended, and afterwards to excise all the veins that go to the breast, or only to compress or agglomerate (*masser*) them by means of the fingers, in order to extract or expel from them that black or atrabilious humor which the ancients had so much dread of.

I. *Immediate union*, which was indicated by Paul and Gahrliep, and lauded by Nannoni, who confined himself to approximating the lips of the wound, and also by Cheselden and Garengeot, who employ the suture, and which has been adopted by almost all the moderns, nevertheless finds some opponents. The objection made to it is that it interferes with the issue of any matters that may form at the bottom of the wound, and of being frequently followed by phlegmonous erysipelas, and consequently that it may jeopardize the success of the operation. These formidable accidents, especially in fat or cachectic women, will be in most cases avoided, if no void is left at the bottom of the wound, if the coaptation is more exact near the muscles than towards the skin, and if the containing means act principally upon the deep-seated parts, and not exclusively upon the cutaneous tissue; if in a word we take care to reserve an opening at a depending part for the escape of the fluids. Moreover, as it is almost next to impossible to obtain perfect primitive reunion, perhaps

it would be more prudent to treat the wound by secondary immediate union. As to the suture, though again warmly recommended by M. Serre, I should not venture to recommend its employment in these cases, until after having seen results from it more fortunate or more conclusive than those which it has given me up to the present time. It evidently renders the operation more painful. Except in certain cases, where the skin is so attenuated that after being dissected it has a tendency to roll up upon itself, adhesive plasters, or the simple bandage, may be perfectly well substituted for it. M. Chaumet, (*Journ. des Conn. Méd.-Chir.*, t. V., p. 117,) who gives three examples of it and eulogizes it, says that the cure in his first patient was effected in 52 days, in 15 days in the second, and in one month in the third; but since without its employment we may, in reality, accomplish the cure in the space of ten to twenty days, I cannot see what advantages it would possess.

### § III.—*Operative Process.*

Though we may, as many practitioners do, support the patient on a chair while we are operating upon her, there are nevertheless indisputable advantages in placing her in a recumbent posture, either upon the bed or upon an operating table. The syncopes are then much less to be apprehended, and the surgeon is in fact much more at his ease. The head and chest are to be sufficiently elevated, to make the breast project as much as possible. The pelote which Bidloo directed to be placed in the axilla, in order to push the breast forward while the arm was directed backwards, would not deserve to be mentioned, if M. S. Cooper had not recommended a precaution which is somewhat analogous and not less curious: he advises that, in order to keep the arm separated from the trunk, to command the movements of the patient, and to force the pectoralis major to become stretched, a baton should be fixed upon each side in the hollow of the axilla, between the chest and the limb!

A. A second assistant *raises up the tumor* with one hand, and with the other sponges up the blood in proportion as it runs out. The surgeon makes traction upon the skin in an opposite direction; commences with the lower semilunar incision; then depresses the mass to be removed and stretches the integuments above; applies the bistoury to the outer angle of the first wound; and makes the upper incision by conducting it to the other extremity of the lower division, and in this manner completes his ellipse. He then seizes the scirrhus or causes it to be grasped, dissects it freely, first from below upwards and then from above downwards; proceeds in such manner that the tumor may continue surrounded by a margin of sound tissues and not be elevated exclusively; cuts down to, or ought not to fear cutting down to, the muscular fibres, and even as far as to the ribs of the thorax, should the extent of the disease require it.

B. If, as I prefer, unless there should be large arteries *that they should not be tied*, the surgeon directs them to be closed with the finger in proportion as the bistoury divides them, and may in this manner terminate in a few seconds the ablation of a breast of the largest volume. Upon the supposition that some morbid layers or

pellets have at first escaped the instrument, we must afterwards return to them without delay. When they belong to the soft parts, they are to be excised by the bistoury or the scissors, and should the bones be affected, the rasp might become necessary. Having arrived at this point we should not even hesitate to extirpate one or more portions of the ribs, should it appear that their removal would enable us to destroy all the parts diseased; but if before commencing, this change had been indicated by any sign, it would in my opinion be much better not to undertake the operation.

C. If there should be found in the arm-pit, glands which create some apprehension, they are when not too remote to be laid bare by prolonging over them the external angle of the wound. In the contrary case it is better to cut down to them by means of incisions independent of the first. Their position, which is calculated to produce some alarm at first view, nevertheless allows of their being extirpated in almost every case without the slightest danger. They are in fact almost always constantly found upon the outer surface of the serratus magnus, so that in order to separate the brachial plexus from them, we have only to raise up the arm and to hold it at a slight distance from the trunk. Nothing moreover is easier, when we are under an apprehension of wounding any vessels of considerable size, than to embrace their pedicle with a ligature after having isolated them in a proper manner, and then to excise them external to the thread. This practice, which had already been recommended by J. L. Petit and Desault, and which Zang and Dupuytren adopt, deserves to be retained. As to the division of the veins it is rarely alarming in respect to hemorrhage. I have seen the axillary vein itself wounded during an operation of this kind, and tamponing suffice for the effectual arrestation of the effusion of blood.

D. If, after having *cleansed the wound* and the surrounding parts, the operator is desirous of attempting immediate reunion, he gently approximates the borders of the division and keeps them in contact by means of the thumb and forefinger of each hand, while the assistant applies the adhesive plasters. In general, the longer the adhesive plasters are, the better. Being stretched over a great extent of surface, their action becomes much less irksome at the cutaneous division, while they are kept on infinitely better than if they were short and more numerous. Some persons, however, allege the contrary, and Prof. A. H. Stevens of New York, among them, recommends that they should be as short as possible. It is necessary that they should cross the wound at a right angle. When the loss of substance is considerable, or that it becomes difficult to bring the integuments into coaptation, there is an advantage in attaching them behind the sound shoulder and then bringing them above the clavicle and conducting them to below the axilla or upon the diseased side. We begin with those of the middle and finish with those at either end. Their number should vary according to the extent of the wound, in front of which they are to form a kind of *grillage* sufficiently close. A plumasseau besmeared with cerate, and one or two gateaux of dried lint with long compresses, supported by a body bandage or the circulars of a long band, passed moreover once or twice in the form

of a *quadriga* around the shoulders, complete the dressing, when the patient is immediately removed to his bed.

E. When we cannot, or do not wish to attempt immediate reunion, adhesive plasters are generally of no use. We then surround the wound with bands of linen besmeared with cerate, or we cover it with a fine linen uniformly imbued with ointment and perforated, in order that the lint which is to be placed over this may be easily removed at the first dressing. If afterwards there should appear the slightest vegetation or tubercle of doubtful character, it should be destroyed without hesitation and as quickly as possible, either by the cutting instrument, the red hot iron, zinc paste, or any other caustic, such, for example, as those recommended by La Poterie, F. Côme, A. Dubois, &c. I will add no remark in this place to what I have already said of caustics in the chapter which is devoted to them in this work and under the article on *tumors*. The cancers which present, in this respect, the least hope of success, belong especially to the cerebriform, melanotic and scirrhous tissues. Those which seem to be, and are in fact, prolonged into the surrounding cellular tissue, by a number of divergent radii or roots, are the most formidable of all, and rarely fail to be reproduced; while on the contrary, the extirpation of colloid cancers, and hydatiform, encysted and tuberculous tumors, is quite often followed by a radical cure.

F. If the case is that of a man, as in the examples related by Bartholin and MM. Sédillot and Petréquin, and in those which belong to myself, the operation should be nevertheless performed after the same rules. But in cases of cysts, whether milky, like those mentioned by Volpi, (Nelaton, *Thèse*, 1839, p. 48,) M. Cumin, (*Trans. Med. Chir. of Edinburgh*, p. 594,) &c., or sanguineous, or sanguinolent, or serous, purulent, or hydatid, or osseous and mucilaginous, like those which I have elsewhere described, it would be better, unless there should be a considerable number of them, to treat them with injections of iodine or by incision, and even simple excision, than to attempt their extirpation. I have only to refer, moreover, for what relates to the different kinds of tumors of the breast, to what I have said of the processes that are applicable to tumors in general, and also to my special memoir (*Traité des Mal. du Sein.*, Paris, 1838,) upon this subject.

## ARTICLE II.—TUMORS OF THE THORAX DISCONNECTED WITH THE MAMMA.

The cases, first of a hypertrophied mamma weighing sixty-four pounds, observed by Durston, (Nelaton, *Thèse de Conc.*, 1839, p. 5,) another which weighed twenty pounds, as mentioned by M. Kober, (*Ibid.*, p. 7,) the three examples of *gynæcomasty*, noticed in man by M. Bedor, (*Ibid.*, p. 17,) those of osseous tumors described by Morgagni, Bidloo, Wolf and Cooper, of tuberculous masses extirpated by M. Gerdy, (*Ibid.*, pp. 45—47,) of milky calculi encountered in animals by Ruysch and Morgagni, and in man or woman by Rufus, Bassius, Kulm, Morgagni, Dupuytren, (*Ibid.*, p. 59,) &c., will have to be added to those which I myself have related. A vast erectile tumor, which occupied the side of the chest and the hollow of the axilla, was extirpated with success by Maréchal, (*Arch. Gén.*

*de Méd.*, t. XXVIII., p. 149.) Having treated in detail, in the chapter on loupes and other tumors, of tumors upon the thorax and in the axilla, it is unnecessary for me to recur to this subject in this place.

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## CHAPTER II.

### EFFUSIONS INTO THE THORAX.

#### ARTICLE I.—EMPYEMA.

##### § I.—*Indications.*

The operation of empyema, performed in the remotest period of antiquity, owes its origin, according to fable, to the despair of Phales or Jason, who, seeking death in the midst of battle, received the thrust of a lance in the chest, and was thus relieved of an empyema, of which no person had ventured to undertake the cure. Galen alleges that in Greece it was performed by plunging a red hot iron through the thorax. At the time of Hippocrates, after having satisfactorily ascertained the existence of a collection, an opening was made into one of the lowest intercostal spaces with the bistoury or a large lancet protected by linen wrapped around it. Others, for fear of evacuating all the liquid too rapidly, perforated the fourth rib by means of a trephine, and then closed up the hole with a plug or tent.

The Arabs appear to have proceeded in the same manner in this respect as the Greeks and Romans. Among both it is perceived that the operation for empyema, first recommended and employed without repugnance by most practitioners, ended in being no longer recommended by any person. Paul of Egina, among the first class, recommends that it should be replaced by cauterization of the thorax, and Haly Abbas, among the second class, formally rejects it. G. de Salicet and Guy de Chauliac speak of it with extreme dread. A. Benedetti, J. de Vigo, and Paré did not succeed but in temporarily rescuing it from the discredit into which it had fallen, and it required all the efforts of J. Fabricius to bring it again into repute; so that it is only in reality during the last two centuries that its advantages and inconveniences have been discussed, and that it has again attracted the attention of surgeons.

A. *Sanguineous Effusions.*—Whether the blood which has accumulated in the pleural cavities proceeds from the intercostal arteries, or from the deeply situated vessels, whether it proceeds from a traumatic lesion, a perforating wound, or a spontaneous laceration, or whether it be arterial or venous, the dangers nevertheless which result from it, and the remedies to be employed for its relief, are nearly the same. The advice that we should immediately proceed to the extraction of the effused liquid, either by placing the patient on the wounded side, by enlarging the wound, or by making use of the mouth, a cupping-glass, or a syringe, to suck out the fluid as it

were with a pump, far from being advantageous, appears on the contrary to be extremely dangerous. Is it not moreover probable, that after the first hours, and until time shall have been given for the blood to become again liquefied, it will be found in part at least in the condition of clots in the chest, and that in such cases it would be impossible to extract it by a puncture? The vessels wounded cannot be obliterated or closed up except by means of clots more or less solid, and a greater or less degree of strong compression. If in place of being retained in the chest, the blood escapes to the outside by this compression, the clots will not be made to form and the hemorrhage will end only in death. Reason therefore instructs us to close up the wounds of the chest immediately at first, in place of dilating them, and to imprison the extravasated blood in the interior instead of procuring an exit for it. If the effusion is inconsiderable, it will generally be removed by absorption; in the contrary case, its source cannot be suppressed but by itself and by the mechanical reaction which it soon exercises against the wounded organs; so that the operation for empyema is under no circumstances proper for recent traumatic hemorrhages of the thorax. Some facts collected in the time of Vigo and Paré, a passage in Francois d'Arce, another in G. Horst, and the remarks of Sharp, and especially of Valentin, would have naturally led to this suggestion; but it was reserved for A. Petit and M. Larrey to have the honor of demonstrating and satisfactorily establishing, that the first indication in perforating (*pénétrantes*) wounds of the chest, whether with or without effusion, is to close them up immediately. If afterwards the system, aided by judicious general treatment, should be found incapable of effecting the dispersion of the morbid collection; or if when the wounded vessels have had time to become obliterated, this collection threatens in itself to give rise to serious accidents, it is then allowable, but only under such circumstances, to have recourse to the operation, and to perform what is denominated a counter opening. The memoir of M. Priou, on wounds of the chest, (*Mém. de l'Acad. Roy. de Méd.*, t. I.) will give the reader every information necessary on the subject of effusions of blood in the thorax.

B. *Effusions of Pus.*—As purulent collections in the chest are far from constituting always the principal disease, the operation for empyema in such cases, in its turn, is far from being always a source of any great benefit. If they have originated from a tuberculous vomica, or any other incurable lesion of the pulmonary organ; if they are the product of a deep-seated alteration still existing in the heart or pleural linings, we should, by giving exit to them, only hasten the death of the patient. If, on the contrary, they have been caused by a simple phlegmasia, or pleurisy for example, or by an abscess in the lung which has made its way into the pleural cavity, the operation presents some chances of success and ought to be made trial of. A vomica opened into the pleural cavity and ultimately presented itself at the left hypochondrium. The pus which flowed out from this part in abundance, was also ejected through the bronchi. When the patient vomited the wound in the side closed up; but when, on the contrary, the pus issued at the hypochondrium the vomiting was arrested, and this condition of things did not ter-

minate until after the expiration of fifteen months. I have met with two other cases of this description, and MM. Jaymes, (*Journ. Gén. de Méd.*, t. 48,) Roc, Wioley, and Davies (*Revue Méd.*, 1836, t. II., p. 260,) have mentioned other similar ones. A peasant in the environs of Tours, operated upon in 1814 by M. Gouraud, was perfectly restored. Freteau, (*Journ. Gén. de Méd.*, t. XLVII., p. 121,) Ollendorf, (*Dict. de Méd.*, 2d edit., t. II., p. 431,) and Audouard (*De l'Empyème, &c.*, 1808,) were no less fortunate. In the cases under consideration the effusion approximates in its character to external abscesses. The organism, in most cases, has adopted the precaution of surrounding it with adhesions, which more or less accurately circumscribe its limits; from whence it happens that after an opening has been made, the remainder of the pleura has nothing to apprehend from the contact of the air. In proportion as it is evacuated its walls may collapse upon themselves, and soon completely close up the void. The same remark, moreover, is applicable to sanguineous effusions, which almost always also ultimately become contracted to more or less circumscribed dimensions, under the influence of the adhesive inflammation of the surrounding surfaces.

C. *Effusions of serosity.*—Serous effusions do not present the same chances of success. The surfaces which supply them are not sufficiently irritated, at least in general, to contract adhesions with each other. The lung gently pushed back towards its root, and soon deprived of all permeability, is then incapable of resuming its natural dimensions, and the chest being once opened into, may place the whole extent of the pleura in contact with the air; so that many surgeons, in such cases, reject even the very idea of the operation. Nevertheless if all the means that reason or experience point out have been tried in vain, if it be not positively ascertained that an incurable organic lesion is the cause of the effusion, and if the alarming symptoms and suffocation threaten the life of the patient, the operation of empyema is a last resource, which it would be unjustifiable not to perform. M. Gouraud effected a remarkable cure by it in 1808. We owe one also to M. Tuson, (*Lond. Med. Gaz.*, June, 1837, p. 396) who, in this manner, extracted nine pints of liquid from the thorax after a pleurisy. M. Caffort (*Private Letter*, October, 1837,) informs me that he has succeeded in four cases out of six; and scientific collections in various places, contain other examples, which I shall shortly speak of. The artificial subtraction of a portion of the effused liquid, so actively promotes absorption in the pectoral cavity, that several practitioners have considered that the operation of empyema should be laid down as a rule after pleurisies whose resolution can be no longer hoped for. It must be confessed, however, that it rarely succeeds under such circumstances. The patient mentioned by M. Martin Solon, (*Journ. Hebd.*, 1830, t. II.,) who declares himself its advocate, perished. The same was the case in the patient operated upon in 1830 at La Charité, and with the one whose thorax was opened into at the hospital of St. Antoine, while I was in service there.

D. *Effusions of Gas.*—The presence of air or gas in the interior of the pleural cavities, which so many physicians have noticed since Itard made it the subject of an interesting memoir, whether it be

caused by the laceration of a pulmonary cell, the decomposition of certain liquids or by a pure and simple exhalation, is also one of those cases which might possibly require the perforation of the thorax. Riolan and H. Bass have had evidence of this in patients in whom the chest, instead of the pus they expected to find there, contained in reality nothing but air. The researches of A. Monro and Gooch, and especially of Hewson, leave not the slightest doubt upon this subject. Nevertheless it is not to be forgotten that under such circumstances it is a symptom of but trivial importance in itself, that may disappear spontaneously, and that if it is accompanied with a deep-seated organic alteration, the operation of empyema will afford but temporary relief.

### § II.—Appreciation.

The successful results obtained from the operation for empyema, moreover, are very numerous at the present day. Besides those above, Baillou, (Bonet, *Corps de Méd.*, t. IV., p. 558.) who made his incision between the fifth and sixth ribs, also mentions one; Mar-chettis (*Ibid.*, t. III., p. 247) mentions two; and Rey, who left a canula in the wound, two others. We are indebted also for two to M. Martini (*Bull. de Fér.*, t. VII., p. 162;) for one to M. Norfini (*Ibid.*, t. XVII., p. 648;) three to M. Herpin (*Precis d'Indre et Loire—Gaz. Méd.*, 1833, p. 417;) three to M. Reybard, (*Arch. Gén. de Méd.*, t. XVII., p. 648.) and two to MM. Tourdes and Malle, (*Bull. de l' Acad. Roy. de Méd.*, t. I., p. 402.) Out of six cases, M. Rey (*Arch. Gén. de Méd.*, 2d ser., t. XII., p. 338) counts four cures; M. Dieffenbach (*Gaz. Méd. Chir.*, t. II., p. 56) has cured three out of four; M. Roque (*Bull. de l' Acad. Roy. de Méd.*, t. I., p. 457) three out of five, and M. Davies (*Encyclogr. Méd.*, p. 49) eight out of ten cases. M. Faure, (*Bull. de l' Acad.*, t. I., p. 62,) however, has obtained only one or two cures out of eight cases, and though MM. Roux, (*Ibid.*, pp. 65, 101,) Bricheteau, (*Ibid.*, p. 124,) Brigham, (*Gaz Méd.*, 1833, p. 324,) Larrey, (*Bull. de l' Acad. Roy. de Méd.*, t. I., p. 160,) and Caffort (*Private Letter*, October, 1837) have each in their turn seen it succeed, and that M. Guérard, (*Arch. Gén. de Méd.*, t. XIII., p. 270,) performing it twice on the same subject at an interval of forty years, has been no less fortunate; though in spite of a syphilis and carious rib, another patient (*Gaz. Méd.*, 1833, p. 418) has also been restored by it, and that M. Reybard has cured almost all those whom he has operated upon,—this operation, nevertheless, has been unattended with success in an infinity of other cases. Performed by M. Bégin (*Elem. de Chir.*, 2d edit., t. II., p. 37) on four different patients, two of whom were attacked with effusions of serum, one with a sero-sanguineous collection caused by hemorrhagic inflammation, and the fourth with effusion of pus, it did not prevent all the four from terminating in a fatal issue after having undergone numerous punctures. I have performed it or seen it performed twelve times myself, in the hospitals of Paris, and every one of the patients died. The dangers that it involves moreover may be readily conceived. If the lung, after having been a long time compressed, has not lost its natural permeability, the air is inhaled into it with force, and may thus become the source of an irritation or violent inflammation imme-

dately after the abstraction of the liquid. Upon the supposition that this organ has shrunk so much as to yield but slowly to the mechanical action of the atmosphere, the species of void which is immediately left about the parts, which up to that time had been steadily supported, necessarily disturbs the pectoral circulation and the respiration. The air without being irritating or injurious in itself, nevertheless, most usually exercises a pernicious influence upon the subsequent symptoms of the disease. Being introduced into the chest it becomes heated and combines as it decomposes with the remains of the effused matter, which speedily acquires acrid and putrid properties which it did not possess before, and the action of which is not sustained by the system without danger. It is this new material, not the air, properly so called, which inflames the cavity and produces a general reaction, which is sometimes exceedingly intense and too often fatal; it is this also which, penetrating in greater or less proportion into the mass of the circulating fluids, infects them and gives rise to adynamic phenomena, to which a great number of the unfortunate persons thus treated fall a prey. The danger therefore would be in proportion to the extent of the walls of the collection, the degree of exhaustion, the irritability, force, and vital resistance of the patient, as well as in relation with the character of the matters effused, and with the conditions of the organs contained in the chest.

### § III.—*Examination of the Methods.*

Three points especially in the operation of empyema require the attention of the surgeon; 1st, the part of the chest at which it is to be performed; 2d, the most suitable instrument for performing it; and 3d, the kind of dressing which becomes necessary.

A. *Place of Election and Place of Necessity.*—When the effusion is not circumscribed by any adhesion, and when the pleural linings are entirely free, it is recommended to open into the pectoral cavity at the part which is the most depending and most favorable for the egress of the liquids, and this point is denominated the *place of election*; when on the contrary, the collection is situated only in one region of the chest, and that it is so exactly circumscribed that neither the position nor the movements of the patient can cause it to change its locality, the opening should be made in a determinate point, and this is what is termed the *place of necessity*. This latter has never varied, nor can it vary at the pleasure of practitioners. The other, on the contrary, being an affair of choice, necessarily cannot be nor has it been in fact the same with all surgeons. Some, for example, with F. Walther, have placed it in the fourth intercostal space, counting from above downward; others, with Leonidas and F. ab Aquapendente, in the fifth; and others, with Sharp, B. Bell, &c., in the sixth. Heers recommends that it should be in the seventh. There are those who, like G. de Salicet and Lanfranc, prefer the eighth; others, with A. Paré, the ninth. Solingen thinks that it is better to select the tenth, as recommended by A. Lusitanus, for the left side, and the ninth for the right; finally, Vesalius and Warner consider that it is the eleventh which offers the most advantages.

I. In our times we generally prefer, at least in France, *the third intercostal space* for the left side and the fourth for the right. Lower down we might wound the diaphragm or liver, or we might run the risk of passing the instrument into the peritoneum and strike below the collection; higher up we should miss the most depending part, and the liquid would not flow with all the facility desirable. To these arguments it is true it might be objected: 1. That in large collections the diaphragm, and the liver with it, is too powerfully crowded downwards to be wounded even when we penetrate between the second and third rib; 2. That we may change at pleasure the depending point of the thorax by giving this or that position to the patient, and that under this point of view the sixth or ninth intercostal space is nearly as advantageous as the third; but as there is moreover no inconvenience in following the precept adopted among us, it would be as advisable to conform to it as to seek for another; so much the more so as the sensation of suffocation which usually distresses those who are afflicted with effusions in the chest, renders any other position difficult for them than that which more or less approximates to the vertical one. Only that I do not consider that we should restrain ourselves too rigorously to perforate above the third rather than the fourth rib, when any difficulty should exist in distinguishing them.

II. *The intercostal space having been once decided upon*, it remains to be determined upon what point of its length the operation should be performed. If very near the sternum, the internal mammary artery might be wounded; farther to the outside is found the descending branch and anastomosing branches of this vessel. In the direction of the spine is situated the mass of the sacro-lumbar and longissimus dorsi muscles; a little farther upon the side, the trunk of the artery not being yet concealed or protected by the lower border of the rib, might be easily opened into. It is therefore with reason that a choice has been made of the point at the union of the posterior third with the two anterior thirds of the contour of the thorax. At that part the incision strikes in front of the latissimus dorsi muscle, between the bundles or digitations of the serratus magnus and obliquus externus abdominis. We have nothing to divide but the integuments, the intercostal muscles and the pleura. The artery now lodged in the infra-costal groove is not yet bifurcated, and the space is sufficiently large to admit the extremity of the finger. Nevertheless if this place should not offer moreover the very important advantage of being the most depending when the patient is slightly inclined upon his side, or seated or lying down, there would be no inconvenience in making the opening farther behind or in front, as David and several other practitioners have recommended.

III. Many methods have been proposed to determine with precision the position of the third intercostal space. If the patient is thin, all that we have to do is to count the ribs from below upwards; but when œdema or a thick layer of cellular or adipose tissue covers the ribs, we are obliged to proceed in another manner. According to some, when the hand of the patient is placed over the front part of the sternum and the arm left pendent upon the side of the trunk, the elbow when slightly pushed backwards, corresponds exactly to the

space sought for. This mode of exploration, besides being very inexact, is much better calculated to conduct us between the two last ribs than between the ninth and tenth; and that which consists in descending to six fingers' breadth below the lower angle of the scapula in order to perforate the chest, would be infinitely more certain and more rational if this locality had really the value which was formerly accorded to it.

IV. Formerly it was a matter of great importance to mark out the *place of necessity* in the operation for empyema. If there was no manifest tumor or thickening of the tissues externally, if a cataplasm which should become dry at an earlier period, according to some, or remain on the contrary a longer time moist, according to others, when placed over the effusion, indicated nothing, it would be necessary to depend upon the sensations experienced by the patient, or to succussion or other means still more fallacious. But the labors of Avenbrugger, Corvisart, Laennec, and M. Pierry, have fortunately dispelled this uncertainty; so that now it is almost as easy to recognize the precise seat and limit of collections in the interior of the chest, as if they were upon the surface of the body.

B. *Instruments.*—Whether for the purpose of guarding against hemorrhage, or for obtaining a wound with loss of substance, or because they considered *escharotics* to possess particular virtues, the ancients and many authors of the middle ages, in order to open into the chest, frequently had recourse to cauteries either chemical or metallic. The cotemporaries of Leonidas made use of a cautery in the form of the kernel of fruit. It was also by means of the iron heated to a white heat that the Cinesias mentioned by Galen was operated upon. The cautery of Rhazes was slender and pointed, while that of Albucasis was of a triangular form. A. Paré recommended that it should be provided with a concave plate at some distance from its point. But this method, long since abandoned, would scarcely merit notice, if it had not been still eulogized by M. Gouraud, who especially uses it for effusions of pus, and gives to the hot iron the advantage of enabling the abscess to empty itself of its own accord upon the fall of the eschar, and to the wound that of resisting the entrance of the air from the tumefaction of its borders. The *scolopomachairion* of Paul of Egina, the *phebotome* of the Arabs, and the *sagitella* of Arculanus, which were formerly made use of, have also disappeared from practice. The ordinary bistoury and trochar, at the present time, are substituted for all other kinds of instruments, when it is our intention to make an opening into the chest. Though Paré had already proposed the paracentesis trochar, in order to perforate one rib rather than the intercostal space, it was not however until after Drouin and Nuck that attention was really turned towards this point. Dionis, Heister, and Morand especially advocated the employment of the trochar, which has still a considerable number of partisans at the present day, and which possesses the advantage of rendering the operation easy, prompt, and attended with but little pain, and the entrance of air into the cavity almost impossible; of not making it necessary to evacuate the entire collection at first; and of permitting in fine the repetition of a considerable number of punctures successively in cases in which this should be judged necessary.

But as on the other hand its canula possesses the inconvenience of not always allowing a sufficiently free exit to matters that are somewhat inspissated, or grumulated pus, or blood partially coagulated, for example, it is far from being applicable in all cases indiscriminately. Moreover the preference is not generally given to it except in hydrothorax and extensive pleuritic effusions. There would be no difficulty moreover in transforming a simple puncture immediately into a large wound, if the liquid at first did not run with sufficient freedom; nor can I perceive how the lung or diaphragm would incur more risk of being wounded by such an instrument than by any other. Paracentesis thoracis moreover is governed in other respects by the same rules as paracentesis abdominis, which will be treated of farther on.

*C. Auxiliary Resources.*—If our object in the operation is to relieve an effusion of air, the wound generally requires no dressing. In other cases, the course to be pursued is not so precisely established. In truth, the pyulcon of Galen, the cupping glasses, syringes, and suction, so much boasted of in the sixteenth and seventeenth centuries, in order to remove the very last drop of extravasated liquid; the different kinds of canulas employed during a long period of time, in order to prevent the pleura from closing up too rapidly, and to enable us to evacuate the chest only by degrees, have lost almost all their importance, although practitioners still ask the question whether we ought or ought not to evacuate at once the morbid collection, or to maintain a foreign body there under the character of a filter, or throw up medicated injections into the cavity rather than to unite the external opening by first intention.

Unless the lung should possess all its natural expansibility, which is a very rare circumstance in hydrothorax, there would be an undoubted advantage in not allowing the serosity to escape except by degrees, and in introducing the extremity of a band of linen or meche of lint into the plural cavity, in order that at each dressing we may procure an additional discharge. Perhaps also repeated punctures with the cataract needle or a very narrow bistoury, would deserve to be made trial of under such circumstances; nor can I see why the employment of this meche ought to be neglected in cases of empyema, properly so called, or in effusion of blood, so long as we attach importance to the circumstance of air not penetrating into the cavity. To perform the paracentesis, moreover, no other instrument is required than the trochar. The employment of injections requires all the attention of the surgeon. It was the abuse which the ancients made of these, which has induced the moderns to proscribe them almost universally. They are not applicable either in hydrothorax or in those effusions which are not limited by any adhesion. In the other cases, on the contrary, it would be difficult to contest their advantages. As soon as the suppuration has a tendency to become degenerated, they alone appear to be capable of preventing adynamia and the decomposition of the fluids, by modifying and cleansing the surface of the morbid cavity, and by favoring the discharge externally of the altered matters in proportion as they are formed. M. Billerey, and M. Récamier (*Bull. de l'Acad. Roy. de Méd.*, t. I., p. 182,) after him, who substitute and retain in the cavity emollient, detergent or

antiseptic liquids, in place of the pus which they have extracted, have had every reason to be satisfied with this practice. It is seen therefore that the precaution of strongly stretching up the skin while we are perforating an intercostal space, in order to prevent the parallelism which, unless we should do this, would be left between the opening into the pleura and that of the integuments, can scarcely be necessary, and that it is far from meriting the importance which has generally been accorded to it since Bass laid it down as a precept.

#### § IV.—*Operative Process.*

A convex or straight bistoury, or a trochar, a vessel to receive the liquid, a strip of trimmed linen, a yard long and one finger's breadth in width, some gateaux of lint and compresses, and a body bandage, form, together with a canula of gum-elastic, and a syringe, all the articles that we can require.

*A. Ordinary Process.*—The patient being seated on a bed, rather than on an arm or common chair, and more or less inclined to his sound side, is to be supported in this position by assistants in such manner that the intercostal space which is to be opened may be widened as much as possible and altogether free. The surgeon being placed upon the right and in front, stretches the skin with his left hand, and with a bistoury in his right hand divides it in a direction parallel to the superior border of the rib below, from left to right on the right side, and from himself if it is on the left side; divides successively, and in the same direction, layer by layer, the adipose covering, a thin layer of cellular tissue, the external muscles of the thorax, if there are any at the point which he has selected, and the external and internal intercostal muscle; reaches the pleura, and in order to perforate it without danger of wounding other organs, then makes use only of the point of the bistoury, resting at its back on the pulp of the left forefinger, which serves him as a director; gives to the internal opening an extent of from six lines to an inch, and penetrates in this manner into the interior of the cavity, from whence he will perceive that the liquid instantly escapes. If, as frequently happens, layers of a new formation should have become adherent to the internal surface of the pleura, the operator will have so much the less reason to be deterred by this difficulty, inasmuch as we may, if necessary, plunge into the tissue of the lung itself, when the abscess has its seat in that part. The important point is not to strike outside of the morbid collection. In event, however, of making a mistake of this kind, it would be better, unless the matter was at so small a distance that we could appreciate its fluctuation with the finger, to make another opening in a suitable place, than to persist in detaching the neighboring adhesions, either by means of the finger, handle of the scalpel or sound, or what is more objectionable, by means of a bladder introduced empty into the wound, and then filled with air or liquid while it is in the thorax, as some of the ancients recommend.

*B. Process of the author.*—The reasons adduced for laying down so many precautions in perforating the parietes of the thorax, appear to me to be but little worthy of the approbation they have received. What danger can there be in penetrating at once into the pleura, or

even in going into the lung? But this accident is not possible, except the instrument should not be directed upon the collection. Moreover, the lung is free and sound behind the wound, and then the pleura is no sooner perforated than the pressure of the atmosphere pushes the lung towards the spine; or intimate adhesions unite it to the walls of the chest, and in this case what danger could arise from a slight puncture of its parenchyma? I am of opinion, therefore, that the operation for empyema would be infinitely more simple, and in every respect as safe, if in order to perform it we should suddenly, and without hesitation, perforate the intercostal space by means of a puncture with the bistoury, held in the second or third position, that is to say, in the same manner as in external abscesses, which are opened from within outwards. We would in this way combine in some measure the advantages of paracentesis with those of incision, and the opening into the chest, which appears so formidable at first sight, would in reality scarcely deserve the name of an operation. I have performed the operation five times by this process, and have not been able to comprehend what advantage there would have been in making use of others. M. Caffort also writes me that he has several times had recourse to it with success.

V. *Dressing.*—I designedly omit speaking of the precept of those who recommend that before incising the integuments, we should take up a large fold of them perpendicular to the ribs, in place of stretching them with the hand, and that of some others who have supposed that the incision of the skin ought to be vertical and not horizontal. It suffices to mention such opinions, to enable every person to appreciate them at their just value. I shall take still less notice of the method of Mercati, which consists in penetrating only as far as the pleura, and without wounding that membrane, in order that the liquid may of itself effect the perforation. It would be equally absurd to finish the operation with a lancet, after making use of the bistoury for its commencement. The object is to arrive with certainty and without danger into the morbid cavity. Nothing, certainly, can be less difficult, and it is not assuredly in this point of view that the operation of empyema should be deemed formidable.

A. An effusion to such extent as to require surgical aid, might cause the death of the patient, if it should be formed at the same time in both sides of the thorax, before we could venture to attempt the operation. Upon the contrary supposition, it would be necessary to follow the rule formerly laid down by A. Benedetti: that is, not to open into the two pleural cavities, until after an interval of some days, and to adopt all the precautions necessary to prevent the crowding back and contraction of the two lungs.

B. If the operator does not wish the wound to remain open, he approximates its lips as soon as there is no longer any liquid to extract from the thoracic cavity, keeps them in contact by means of a strip of adhesive plaster, then covers them with a gateau of lint, followed by a compress, and secures the whole by means of a body-bandage drawn moderately tight. If the whole of the matter has not been evacuated, the flat dressing with lint besmeared with cerate, is generally sufficient to prevent the too speedy adhesion of the borders of the perforation. In order, however, to have our

minds at rest on this point, there is no objection to the surgeon inserting into the solution of continuity, by means of the meche-holder, a small cone of lint or one of the extremities of a linen band prepared for this purpose: in other respects he is to proceed as above. The tents which were formerly employed for this purpose, and which were attached outside by means of a thread, besides the inconvenience of forming a plug, also possessed, as in the example related by Guy, that of the possibility of their escaping into the morbid cavity and becoming lost there.

C. So long as the fluids that flow out at each dressing, preserve their primitive character and do not deteriorate, injections could not but be injurious. We ought to have recourse to them, on the contrary, upon the slightest change being manifested. Under this point of view, tepid water at first, sweetened barley water, diluted lime or lead water, or a weak decoction of bark, are to be successively or alternately used, also other detergent, astringent, or antiseptic liquids, which the practitioner will know how to select according to the indication. M. Bache, (*Thèse*, No. 66, Paris, 1827,) avers that this method which has been for a long time adopted at the Hospital of Grenoble by M. Billerey, who, moreover is in the habit of closing the wound in the interval of the dressings, by means of a plug of gentian, has been frequently attended with complete success in that establishment.

D. The apparatus contrived by M. G. Pelletan, (*Bull. de l'Acad.*, t. I., p. 227, or *Gaz. Méd.*, 1830, p. 185,) and which by means of canulas and valves. (soupapes,) permits the establishment of a double current for the liquid, while preventing at the same time the introduction of air into the thorax, which apparatus moreover is based upon the same principle as that of M. Héroldt, is too complicated and of too little importance for practitioners to assent to its employment. I would make the same remark of those which have been since proposed by MM. Bonvier, (*Bull. de l'Acad. Roy. de Méd.*, t. I., p. 73,) Maissiat, Récamier, (*Ibid.*, p. 182,) &c. The small canula provided with a perforated sac of goldbeater's skin, made use of by M. Reybard, (*Mém. sur les Anus Artific.* &c., p. 157,) would be at once more certain, simple, and convenient, if it were advisable to adopt any precaution to prevent the entrance of air into the thorax.

[*Paracentesis of the Thorax*.—M. Troussseau, (*Arch. Gén. de Paris*, 4e ser., t. VI., Sept. 1844, or *Journal de Médecine de Paris*, Novembre, 1843, and Aout, 1844,) advocates this operation, where there is decided effusion and displacement of the heart, not only in chronic but also in acute cases of pleurisy. He has performed it once in acute, and twice in chronic pleurisy, and in both the latter, as he thinks, it saved the life of the patients. Laennec had also long since recommended it as a dernier resort in such cases, to prevent immediate suffocation. Our remarks on tracheotomy, (see notes supra,) apply to paracentesis thoracis. As to the danger of the lungs being *suffocated*, as Laennec considered, by the compression of the diffused fluid in the pleural cavities, this is doubtless possible, where active depletion has been neglected. But certain it is, that one lung may be *gradually* almost entirely absorbed by compression from such fluid, without causing death. While at the Seamen's Retreat, I saw a striking case of this in a patient who died of a protract-

ed hydrothorax and general dropsy. One lung was reduced down to the size of a dog's ear, and was floating in an ocean of circumambient transparent serum in the pleural cavity, and this without the normal organic structure of the lobes of this miniature lung being apparently in the least degree altered! T.]

## ARTICLE II.—WOUNDING OF THE INTERCOSTAL ARTERY.

### § I.

Upon the supposition that the *diaphragm had been wounded*, during the operation of empyema, an instance of which was witnessed by Solingen, we should have no other resources than those of medicine to oppose to it, and the wounding of the intercostal artery is, in fact, the only accident which in these cases can require the interposition of surgery. Though rare, this wound, however, has occupied much of the attention of authors, to so great a degree in fact, that the number of remedies that have been proposed for its relief, perhaps exceed that of the number of times that the accident has occurred, unless perhaps it be that it has been frequently overlooked and the proper remedy neglected, even in those cases in which the effusion, which it has produced, has resulted in a fatal issue, an example of which has been published by M. Thierry (*Bibliot. Méd.*, 1828, t. I., p. 240.) The cases in which it has been especially met with, are those from wounds penetrating into the chest. It is recognized by the hemorrhage which it occasions, the symptoms of effusion which follow, the paleness, syncope, &c. A piece of card introduced into the bottom of the wound and curved into the shape of a gutter, enables us to ascertain the direction from whence the blood escapes. The finger glided under the rib will frequently distinguish a hot or pulsating jet of blood difficult to be mistaken, and forms one of the surest diagnostic marks when its employment is practicable.

### § II.

*Gérard*, by means of a thread *introduced into the wound*, and brought from within outwards by the aid of a curved needle, through the intercostal space above, conducted a tent below the artery, which he hoped in this manner to compress by constricting the entire circumference of the rib. *Goulard*, with the view of rendering it unnecessary to withdraw the whole of the conducting instrument through the new wound, contrived a needle with a curved handle, like that of *Gérard*, pierced with an eye near its point, and hollowed out upon its convexity with a groove which was intended to receive the thread. *Heuermann* alleges that by means of a needle strongly curved and fixed at an angle upon its handle, we may surround the bone in such manner as to bring out the two extremities of the thread through the same wound. *Leber*, after having made a second opening above the rib, used this opening to conduct a thread which he caused to come out through the wound, and the two ends of which he afterwards knotted upon a compress after the manner of *Gérard*. To effect this, he made use of a flat and flexible sound, which *Steidèle*

has replaced by one of silver, curved into the shape of an S, and for which *Boestcher* has, according to *Sprengel*, substituted a smooth and blunt-pointed steel sound. Finally, *Reich*, instead of fastening the thread by a knot, recommends that its extremities should be passed through a gum-elastic canula, which is to be secured outside; but all these processes are useless, as well as the double plate of *Lottery*, the *jeton* of *Quesnay*, and the *machine* of *Bellocq*.

### § III.

Nor does the *tent strangulated* in its middle portion by a thread tied strongly around it, and then introduced transversely into the pleura, and afterwards placed in a vertical position, in order that when making traction upon it, it will no longer be possible to draw it out, and that it may compress at the same time the artery as well as the borders of the two neighboring ribs, deserve the eulogies that have been bestowed upon it by *Bilguer*, *Richter*, *Desault*, and *Sabatier*. *Theden* maintains that in order to arrest the hemorrhage, nothing more is required than to complete the division of the artery, reverse its posterior end backwards, and tampone the wound. I will remark that we may frequently effect the same result without reversing the vessel, as has been shown by *Hebeinstreit*. It is difficult to understand why *Loefler* should have thought it proper to recommend an opening into the intercostal space a little farther behind, leaving the pleura intact, in order to divide the artery at this point, and to apply the tamponing there, without interfering in any respect with the exit of the effused matters, through the first opening.

### § IV.

*Bell*, rejecting all these processes, finds it more convenient to seize with a hook the end of the wounded vessel, and to apply a ligature to it immediately. There are those who have ventured to establish a point of compression upon the wound of the vessel during the space of several days, by means of the fingers of assistants alternately relieved. But upon the supposition that prompt action was necessary, we might readily arrest the hemorrhage by introducing after the manner of *Desault* and *Zang*, the middle portion of a fine compress into the chest. After having filled the bottom of this kind of sac with lint or tow, to transform its internal portion into a pelote, there would be nothing more to do than to shut up its external portion and make traction upon it, in such manner as to compress from within outwards, until the blood had ceased to flow. This small apparatus moreover could be readily secured, by tying the free portion of the linen for example, upon another pelote of lint. This resource, the only one to which *M. Larrey* gave his assent, when from any reason whatever it was not judged practicable to attempt immediate reunion of the wound, being applicable to all cases, and possessing the advantage of being always at command, and of being readily understood by every person, ought to have the preference over all the others, and should unquestionably be substituted for them.

## ARTICLE III.—PARACENTESIS OF THE PERICARDIUM.

§ I.—*Appreciation.*

The idea of opening into the pericardium when filled with serosity, pus or blood, appeared so bold at first that many persons still look upon it as rash and unwarrantable. Timid surgeons have been deterred by it from the fear of wounding the heart. Others reject it because it might excite an inflammation which, from its situation, would speedily result in death. The difficulty of recognizing the disease with certainty during life, and the objection that we should give relief only to one symptom, is the argument which the most judicious have adduced against it. None of these various objections, however, are of a character to cause it to be absolutely proscribed. The skilful practitioner, aided by the explorative resources that science possesses at the present day, will rarely find himself incapable of establishing a diagnosis of effusion in the pericardium. The heart may be always avoided. By evacuating a serous membrane of the liquid which has accumulated within it, we disembarass it of a foreign body, and the puncture is in this sense more calculated to diminish than to give rise to inflammation. It is true that with the operation the patient is exposed to great danger; but without it he is devoted to a speedy and certain death. If the paracentesis does not cure, it may at least afford momentary relief. Nevertheless it is unfortunate that experience should have furnished scarcely any elucidation; and that it should still present only ideas that are purely theoretical upon a subject of so serious a nature. Senac, who has been erroneously thought to have been the first to propose puncture of the pericardium, gives no instance of it, and the case imputed to him by Sprengel relates, in reality, to hydrothorax. Van Swieten and H. Welse, referred to by M. Rayer, express themselves still more confusedly. Nor does Riolan, who speaks of it as a general suggestion, assert that it had been performed in his time. It is well known that the pretended pericardium that Desault supposed he had opened, was nothing else than an accidental cyst. We do not find that M. Skielderup has furnished anything conclusive in support of his opinions. It is also evident that the collection which was opened by M. Larrey was situated external to the pericardium. The three observations related by M. Romero, (*Bull. de la Fac. de Med.*, t. IV., p. 273,) and the substance of which has been given by M. Mérat, are too imperfect not to leave the mind in considerable doubt. The one that M. Jowet (*Bull. de Ferr.*, t. XIII., p. 233,) has published in 1827, as the first instance of a successful result, is also incapable of removing all doubts upon this subject. But though it may still remain to be demonstrated that paracentesis of the pericardium has ever been performed upon living man, except perhaps in the case which M. Warren has communicated to me; facts are not wanting to show indisputably that the perforation of this membrane does not necessarily cause death. The thesis of M. A. Sanson furnishes many proofs of this. M. Larrey also relates several, and I myself have collected other examples.—(See *Wounds of the Heart*, Vol. II.)

## § II.—*Operative Process.*

The pericardium, in its natural state, is accessible at a great number of points to surgical means. Effusions, by distending it to an abnormal degree, would enable it to be still more readily attacked.

A. Riolan maintains, and others have agreed with him, that we may puncture the pericardium by *trephining* the sternum, an inch above the xiphoid cartilage. This opinion, revived as a new one, and with all the necessary details, by *M. Skielderup*, has found some partisans among the moderns. Laennec, among others, adopts it, and endeavors to demonstrate its advantages, which are that of avoiding with certainty the internal mammary artery, that of going down inevitably upon the distended pouch, and of not making an opening into the pleura. *Senac* recommends that we should make the opening in the fifth or sixth intercostal space, a little to the left of the sternum, and that the *trochar*, introduced at that point, should be introduced very obliquely downwards, and to the right, until it reached the collection to be evacuated. *Desault*, in order not to wound the mammary artery, made his incision more to the outside, and did not penetrate into the morbid collection until after having identified its fluctuation by means of the finger. This also is the method which is eulogized by *M. Romero*, who, in place of the *trochar* of Senac, or the blunt-pointed bistoury of Desault, preferred the scissors for dividing the pericardium, after having raised up a fold of it by means of the forceps. Finally, *M. Larrey* considers it better to perforate from below upwards, the space which separates the left border of the xiphoid appendix, from the cartilage of the last true rib; that we would in this manner avoid the pleura, incur no risk of wounding the peritoneum, diaphragm, or internal mammary artery, and would strike upon the most depending part of the pericardium.

B. Trephining of the sternum unquestionably is the most simple process which has been proposed. The bone which is thus perforated is soft, and superficial, and destitute of vessels on both its surfaces. It enables us to see and to touch the pericardium before opening it, and to forego the last stage of the operation, which is the only one that is dangerous, should the surgeon have misconceived the situation of the hydropsy. The fluid cannot be effused into the pleural cavity. I see no other inconvenience in it than that of occasioning a loss of substance, which renders the immediate reunion of the wound difficult, and which unavoidably places the interior of the cavity in contact with the atmospheric air. But is it not better to leave the perforation of the pericardium open, than to shut it up before having removed the source of the mischief? Is not the action of the air, in such cases, a result which is rather to be desired than to be dreaded? The danger which the pleura incurs, whatever precaution we may take to avoid it, and also the internal mammary, in the method of *Senac*, slightly modified by *Desault* and *MM. Romero* and *Jowet*, are certainly not considerations that ought to outweigh the preceding process. The process of *M. Larrey*, which might possibly procure the same result as the trephining of the sternum, is not so easy of application as its inventor supposed in

subjects in whom œdema, infiltration, or embonpoint exists, to such extent that the skin does not come into immediate contact with the external surface of the bones or cartilages of the thorax. The branch of the mammary artery, moreover, which crosses the anterior face of the ensiform prolongation, is sometimes so voluminous that its division, which is almost unavoidable, might give rise to an alarming hemorrhage. In conclusion, therefore, it would appear to me prudent to adopt the advice of Riolan, which is also sanctioned by Boyer. The crown of the trephine should be applied upon the left half of the sternum, immediately above the xiphoid appendix, in order that it might fall upon the broadest portion of the anterior space of the mediastinum. The left forefinger introduced into the bottom of the wound would then enable us to identify the fluctuation, and would serve as a guide for the bistoury. Having opened into the pericardium, it would become advisable to turn the patient upon his left side, and more than ever to keep his chest in a position almost vertical, in order to give egress to the liquid, which should be allowed to flow out gently. The dressing would consist of a meche introduced into the orifice of the serous sac, a plumasseau besmeared with cerate, some compresses, and a body bandage, in order to support the whole, precisely as in the operation for empyema.

C. *Injections.*—The idea of treating hydropericardia in the manner of a hydrocele, and of injecting an irritating liquid into the diseased cavity in order to promote adhesive inflammation, has nothing in it repugnant to sound reason, and those who have reproached M. Richerand for having suggested it, have done so improperly. If the puncture, besides evacuating the liquid, does not in itself cause adhesion, it is useless to count upon its affording relief, except as a simple palliative. The radical cure of hydropericardia without obliteration of the altered sac is no more possible than that of hydrocele. If it ever has been obtained, it is because the practitioner, without having intended it, has carried out the indication first proposed by M. Richerand, and since by Laennec. The contact of the air, moreover, would perhaps suffice to bring about the necessary degree of inflammation. When there is no organic lesion, tepid water or some other liquid only slightly irritating, should be first made trial of. Should the case be one of effusion of pus, the injection should be varied according to the indications, in the same way as after empyema. In whatever manner performed, I should recommend that the incision into the pericardium, when the bistoury is made use of, should be large, and that it should be kept open until the termination of the treatment. The treatment would be then analogous to that of hydrocele by incision or excision, and the effusion which generally follows the injection of the tunica vaginalis after puncture would not jeopardize the final result. If the case should be one of serous effusion, I should prefer after having laid bare the part, to plunge in a trochar and after having emptied it to inject it, with a solution of tincture of iodine, as is my general practice in hydrocele. It is probable that we might in this manner effect an agglutination of the pericardium to the heart. These however are nothing more than suppositions. Before attaching any value to them or applying them

to living man, we ought, by experiments upon living animals, to ascertain how far they are founded on truth. It is a point in practice which cannot cease to be interesting. The rarity of the cases which would enable us to take advantage of it is the only plausible reason which appears to me to diminish its importance.

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## PART FOURTH.

### ABDOMEN.

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#### CHAPTER I.

##### EFFUSIONS, CYSTS AND FISTULAS.

###### ARTICLE I.—PARACENTESIS.

Puncture of the lower belly in cases of *dropsy* is one of the most ancient operations of surgery. The first suggestion of it must have been derived from accidents, of which history furnishes a great number of examples. Nothing in fact is more common in the annals of science, than cases of ascites cured in consequence of a wound of the abdomen. A child, says Meysonnier, (*Cours de Méd.*, 7th edit., 4to, p. 276,) who was amusing himself in playing with a knife in the yard of a peasant who had ascites, was thrust by his little companions against the unfortunate patient, and cut an opening into his belly. A great quantity of water ran out through the wound, so that at the expiration of a few weeks the patient found himself radically cured! Another ascitic, finding no surgeon willing to undertake the puncture, resolved to perform it himself. Prohibition having been made to allow any thing to be placed at his disposal which could enable him to carry out his intention, he concluded to break the glass which he used for drinking and shape out a piece of it, which he plunged in below the navel. A radical cure was the reward of his temerity. There is no doubt that the same circumstances have led to the same result in the remotest antiquity, and that paracentesis abdominis is as ancient as medicine itself. A patient operated upon by M. Isabeau, though affected at the same time with hydrothorax, was perfectly cured of his ascites. M. Dupasquier, who in another case had recourse to diuretics after puncture, was no less fortunate.

###### § I.—*Indications.*

When the ascites is the result of an incurable affection of one of the organs contained in the belly, it is evident that puncture cannot cure it, and that we must then resort to this only for the purpose of procuring temporary relief to the patient. But if the dropsy is *essential* and *idiopathic*, the extraction of the effused liquid cannot but favor the action of the general treatment and co-operate in the re-

establishment of the health. In the first case we should not operate but at as late a period as possible, and to prevent suffocation; in the second case, it would be advisable to adopt the recommendation of Duverney and Bertrand, as revived by Broussais, and give egress in good season to the effused liquid.

A. *Compression*.—It is so seldom that we see ascites terminate fortunately, that after having unavailingly made trial of the means that experience appears to have placed most confidence in, for example, *compression*, which I have seen succeed in one instance in a boy fourteen years of age at the hospital of Tours, in 1818, and the advantages of which are eulogized by M. Speranza (*Bibl. Méd.*, 1829, t. II., p. 242,) and M. Godèle, (*Revue Méd.*, 1831, t. I., p. 12,) and the good effects of which were recognized at the Hotel Dieu in 1831, and its efficacy since placed beyond all dispute by M. Bricheteau, (*Arch. Gén. de Méd.*, t. XXXIII., pp. 75—93,) it is allowable to appeal from these modes to the operation, however feeble may be the hope of its success. It must be that MM. J. Darwell and J. Copeland, (*Cyclop. of Pract. Med.*, vol. I., p. 169,) who were desirous of having it proscribed in practice, and who have advanced against it a great number of unmerited reproaches, have not seen it employed in practice, or have been rarely witnesses to the distress which ascites sometimes occasions.

B. Temporary *blisterrings*, recommended by Trouvé. (*Arch. Gén. de Méd.*, t. XVIII., p. 200,) have been employed by myself of a size which might be called *monstrous*, and in my opinion deserve farther trials.

C. Encouraged by what Thouvenot says of his needles and small canulas, by what I have seen myself, and by what has been stated in England, of acupuncture in hydrocele, I was desirous also of making trial of this method, after the manner of M. King, in ascites. Having plunged in upon five or six points of the belly a long common or cataract needle, and having repeated this process three or four times in the space of fifteen days upon two women, I saw an improvement take place which surprised me, and which would justify additional trials of the same description.

## § II.—*Examination of the Processes.*

A. *The red hot iron* formerly used, caustics by which an ulcer was first made, and which it was afterwards necessary to lay open in order to reach the peritoneum, together with the *seton*, as recommended by others, have long since given place to more rational processes. The method of Paul of Egina and Guy de Chauliac, which was still lauded by Pigray, and which consists in dividing the integuments by means of a *bistouri*, and then perforating the aponeurosis or muscles a little higher up, in order to be enabled to shut up at pleasure the deeper wound, by allowing the skin, which had been previously raised up, to glide over in front of it, has been also abandoned, as well as all those which were performed by means of a cutting instrument.

B. *The needle*, and the small canulas of Thouvenot, (*Planque, Bibl.*, t. V., p. 665,) or of Barbette, evidently indicated by Rhazes, the

instrument of Block or Girault, and the trochar canula of Sanctorius, the invention of which Camper pretends to trace up to Hippocrates, variously modified by others, especially by J. L. Petit, who constructed from it the instrument known at the present day under the name of trochar or trois-quarts, render the puncture of the abdomen so simple and easy, that for a century past there is no longer any more question of the bistoury or lancet than of the cautery, when our intention is to penetrate into the peritoneum for ascites.

C. Some modern surgeons, however, seem desirous of reviving the method by incision. Physick, among others, alleges that the operation is much less painful with the lancet than with the trochar, and Dorsey says that in America this last mentioned instrument will soon fall into disrepute. M. Callaway, a surgeon of London, has more recently endeavored to prove that we ought in reality to give preference to the lancet in puncturing the lower belly. Guided by the left forefinger, which serves as a point d'appui to it, we introduce it with the right hand on the linea alba above the pubis; we then immediately insert, through the wound into the cavity of the peritoneum, a female catheter, when the operation has no longer anything particular. This process, which had already been proposed by Petit-Radel, and which is the same in fact as that of Cœlius Aurelianus, might be followed without inconvenience; but it is doubtful if in fact it possesses any real advantages over the method adopted among us. If the cutting instrument encounters any vascular branches, it divides them unavoidably, and all the organs within its reach will be exposed to the same casualty; while the trochar separates apart, and rather displaces than divides the movable organs which present themselves in front of it. The wound made by its passage immediately closes as soon as the instrument is withdrawn. That which the lancet makes, on the contrary, remains open, and presents no obstacle to the egress of the serum through it.

D. The *flat trochar* of Wilson, or the flattened one (*méplat*) of Andre, which, by the advice of B. Bell, many practitioners in Great Britain prefer to Petit's instrument, because as they assert it scarcely differs from a cutting instrument, is wholly undeserving of such a predilection. The jointed trochar, those in which the point is conical, serpent-tongued, or more or less flattened, in place of being triangular, together with the fifty other descriptions which have been extolled, are not worthy of being mentioned. The one which has received the approbation of the French surgeons leaves nothing to desire, and the modifications which have been attempted upon it since the time of J. L. Petit are calculated only to render it less perfect.

I. *Place of election.*—All parts of the belly are not equally suitable for paracentesis. The *left flank* would be more favorable when the spleen is sound, if the epiploon, which extends further upon this side, did not present any obstacle to the egress of the liquid. Upon the *right side* we should have to fear the presence of the liver; while were we too near to *Poupart's ligament*, we might encounter the sigmoid flexure of the colon or the cæcum. *Posteriorly*, we have the last false rib or crest of the os innominatum, and we might readily wound the lumbar portion of the colon. The *supra-umbilical zone* corresponds to the transverse portion of the large intestine.

*Far down upon the median line we encounter the bladder.* We must select, nevertheless a depending part. The linea alba, preferred by the ancients, and even still by most English surgeons, has no advantage in this respect; and it is far from protecting us with as much certainty as has been supposed, from every kind of hemorrhage. A large vein sometimes runs over its posterior surface, and M. S. Cooper mentions a case in which more than a pint of blood came from a wound which he made in this place with a bistoury.

*a.* In *women* there is found between the womb and the rectum at the bottom of the pelvis, a cul de sac, by which we could readily reach through the postero-superior part of the *vagina*. This, which is the most depending point of all, would also be perhaps the most suitable, if the peritoneum were free throughout its whole extent, and if any change whatever in the relations of the bladder, uterus, or intestines, would not unavoidably expose to the risk of perforating one of these organs. We ought not therefore to select it, nor to conform to the rule laid down by Henckel, Watson, Bishop, and Noethig, until after having satisfied ourselves by the touch, that the serum had descended down as far as the pelvic cavity, and that it has a tendency to depress the upper part of the *vagina*.

*b.* In penetrating by the *rectum* above the *vesiculae seminales*, as some other practitioners recommend, there would be still greater danger of wounding the bladder. The danger of finding stercoral matter afterwards passing through the rectum into the peritoneal cavity, will be sufficient to cause this route always to be rejected, though it might be adopted in certain cases as an exception.

*c.* Even the *bladder* has been perforated for the purpose of emptying the peritoneal cavity of dropsical patients. M. H. Bérard mentions a case in his thesis. A case was thought to be *ischuria*. The sound was forcibly introduced into the urethra, when several pints of serum escaped, and the patient died. The opening of his body proved that it was ascites, and that the instrument had entered into his belly. A surgeon of London, M. Watson, has gravely proposed to penetrate designedly by this route, and what is not less surprising, one of his countrymen, M. Buchanan, states that he has done it in three instances with success; but it will never be necessary among us, I think, to seriously undertake the refutation of a principle like this.

*d.* The *scrotum*, which is the best route, as the observations of Le Dran and Morand show, when there is at the same time ascites and congenital hydrocele, can be applicable only under these circumstances. If we should meet with a region in the abdominal parietes more attenuated than others, to such degree as to be formed only by the skin, and to have acquired a sort of transparency, this is the place we should select, however unfavorable it may be in other respects.

*e.* The *navel*, which frequently presents this peculiarity, and which Lanfranc and the two Fabricii recommend, is the point which M. Ollivier, (*Arch. Gén. de Méd.*, t. VI., p. 178,) on the strength of a fact occurring in his own practice, and on another in that of M. Bigot of Angers, proposes to perforate in *pregnant women*. Scarpa, (*Bull. de Fér.*, t. II., p. 256,) on the contrary, and after him M. Langstaff, (*Arch. Gén. de Méd.*, t. VIII., p. 267,) or M. Cruch,

recommend that during pregnancy the puncture should be made in the left hypochondrium, that is, a little below the third false rib. Like M. Emery, who says he has performed it six times in a single female, I have had recourse several times to paracentesis in women in the state of gestation, and three times, among others, during the same pregnancy. The whole extent of the left flank and all the points on this side where the trochar is usually applied, have seemed to me, separated from the womb by an interval of too great an extent to make it necessary to attach much importance to the precepts of Scarpa.

f. A little to the *outside* of the *linea alba* where the puncture was formerly made according to the recommendation of Celsus, we incur some risk of wounding the epigastric artery. The middle of the space that separates the ribs from the spine of the ilium, as indicated by Sabatier, would have the inconvenience of being too near the chest, should the spleen and the liver be affected with any engorgement; so that, as a general rule, the middle of the line which extends from the umbilicus to the antero-superior spinous process of the ilium is still the one which should have the preference. Here the instrument can touch neither the bladder nor the womb, unless either should be very much developed, nor the epigastric artery which is on the inside, nor the anterior iliac artery which is to the outside, nor the colon which is behind and below. This place, which the majority of operators have recommended should be chosen since Palfin first suggested it, is therefore the true *place of election*, and any of the others the *place of necessity*.

g. In ordinary ascites the wounding of the intestines or their arteries is next to impossible. The contained serum must naturally push them towards the diaphragm or in the direction of the spine. Though they should even remain free and floating, the mesentery is not long enough for the trochar to reach them. But should a noose of intestines have become adherent to the walls of the abdomen, there is no doubt that the instrument might open into them and give egress to fœcal matters, examples of which are on record.

II. *Encysted dropsy*, which may have its seat in an ovary, in the cavity of the epiploons, in a portion of the peritoneum limited by adhesions, or in some particular accidental sac, would also incur the risk of the same accident. Being surrounded by thick walls we are compelled in most instances to penetrate deeper, sometimes, according to Mouton, to the distance of four inches before reaching the collection, which consequently makes it necessary that it should be identified if possible before commencing the operation.

III. *Position of the patient*.—No one at the present day recommends that the patient should stand up during the operation, nor except under certain circumstances is it convenient for him to be seated in a chair. The proper position for him is upon his side and very near the edge of the bed. While the liquid is running out, an assistant, stationed upon the opposite site, gently compresses the walls of the belly by means of his two hands broadly spread out. Without this precaution, which the ancients neglected, the viscera and the large vascular trunks, suddenly deprived of the pressure to which they had been habituated, might give rise occasionally to syncopes, swoonings and convulsions, all of which it is important to avoid. The species of

bandage or corset contrived by Monro, as a substitute for the hands of an assistant, and to be used after the operation as the dressing, though very ingenious, does not, inasmuch as it but imperfectly fulfills the indication, merit the preference which some persons have accorded to it. To apply it beforehand and tighten it by degrees as the belly is emptied, to maintain opposite to the proper place, the hole which it has on its side for the passage of the trochar, and afterwards to pad the cavities which might be left in the direction of the iliac fossæ, &c., are details too trivial to engage the attention of surgeons, unless they should be necessary. The folded sheet passed around the belly, and the two extremities of which are gradually drawn upon by two assistants while the water is running out, as recommended by M. S. Cooper, would be still more objectionable. If the effusion has its seat in the peritoneal cavity, it is possible that the epiploon, or a noose of intestine, or a flocculus of albumen or an hydatid, may become entangled in the extremity of the canula and shut it up before the liquid is completely withdrawn. A stilette or any blunt-pointed rod whatever, passed through the instrument, will be found sufficient to push aside these substances, and to give the passage of the liquid all the freedom it had at first. As serous cysts do not scarcely ever contain anything but limpid serosity, they are generally exempt from this inconvenience; but dropsy of the ovarium, which almost always consists of an oily or gelatinous matter, more or less inspissated, of a yellow, reddish or darkish color, and rarely of great fluidity, sometimes presents this difficulty, and requires at least the employment of a canula of somewhat large dimensions.

IV. *Extraction of the liquid.*—Many authors have considered that we ought not to remove all the contained fluid at once, but that it would be better to extract it by degrees. It was for this purpose that Paul of Egina, Guy de Chauliac, &c., avoided perforating the skin and peritoneum at the same point; that already at the time of Hippocrates they were in the habit of placing in the wound a small canula which has since been modified in a thousand different ways, and which was made use of in some respects as a faucet for plugging up or unplugging the opening at pleasure; that others extracted first only a small quantity of the liquid fluid to return afterwards to the repetition of the same operation a greater or less number of times; and that it was proposed, after having opened into the belly with a lancet, to leave the matter to ooze out gently and imperceptibly of itself. But as experience has furnished no positive evidence of the utility of this method, it appears to be more rational not to leave in the belly anything but that which cannot be extracted from it. The exhaustion and the syncopes which the ancients expected to prevent by acting in this manner, are still more effectually prevented by means of a bandage suitably applied, and patients, after having submitted to this operation, would be poorly satisfied if their belly was but partially emptied.

V. *Dressing.*—*The compressing bandage after the puncture*, not only has the advantage of supporting the viscera, but is also a powerful auxiliary in effecting a radical cure. The authentic facts in support of this assertion are now sufficiently numerous to induce us to add to their number more and more. In the spring of 1831, I was

desired by M. Rousseau, a physician at Batignolles, to puncture the abdomen in a child five years of age, affected with ascites during the previous 8 months. We withdrew six litres of limpid water from the abdomen. No alteration in the viscera could be recognized through the walls of the belly. A methodical and gentle pressure was immediately applied; the effusion was not reproduced, and the little patient soon recovered its former health. M. Fenoglio. (*Gaz. Med.*, 1832, p. 588, 589,) in operating on a woman 22 years of age, whose belly contained 36 pounds of water, and afterwards on a man aged 40 years, and from whom 40 pounds of serosity were extracted, succeeded equally well in both cases. The manner of applying compression in such cases, must be left to the discretion of the operator. Whether we make it with a flannel band, as recommended by M. S. Cooper, after the advice of Bell, with Monro's bandage, or with a sort of losange terminated in a scapulary above, and by infra-crural bandages below, in such a manner that it may be conveniently tightened transversely; or make use simply of a body bandage, and compresses or other napkins folded in various ways upon the hypogastrium and flanks; provided the compression is methodical and regular, the rest is a matter of little importance. Large temporary blisters after the puncture in patients who cannot support compression, would probably afford more chance of success than before the operation.

VI. *Injections.*—Some persons think that the radical cure of ascites might be accomplished after the puncture, by adopting another method. Noticing what happens in hydrocele, they have proposed to throw up into the peritoneal cavity irritating liquids, in order to favor its adhesive inflammation. Brenner, who appears to have been the first to make this suggestion, and who had no other object than to give tone to the viscera, proposed a solution of camphor, aloes and myrrh in *brandy*. Warick made trial of it and cured his patient. Repeated with *red wine and tar water*, these injections were not attended with the same success, and the two women died. Warrick, after having made trial of the process of Hales, who recommended that a canula should be placed on each side of the belly, in order that the liquid might be enabled to run out of one while the injection was thrown up through the other, ultimately gave a preference to Bristol waters and simple puncture. Though since recommended by Heuermann, Bossu, and others, injections in ascites were wholly proscribed, until a few years since the annals of Broussais brought to their support two cases of success obtained by means of the vapor of wine. M. Lhomme, (*Arch. Gén. de Méd.*, t. XIII., p. 282,) emboldened by these examples, ventured to make trial of the same process in an adult who had already several times undergone puncture. The result exceeded his hopes. His patient, as well as that of M. Gobert, and that of M. La Faye, (*Lancette Franc.*, t. II., No. 88,) continues to enjoy excellent health. A question of so serious a character, requires more conclusive facts before it can be solved. There is nothing to show that M. Lhomme actually caused the *vapor of wine* to pass into the belly. He filled, he says, a syringe with it, but the linen wet with cold water, and with which he thought it necessary to wrap the canula, through which the vapor had to pass, must have necessarily condensed it immediately; so that very probably it was air, and not wine, injected

into the abdomen. The patient operated upon with it by M. Dupuy, (*Arch. Gén. de Méd.*, February, 1832, t. XXVIII., p. 271,) died. The cases of M. Jobert, (*Lanc. Franc.*, No. 70, 73,) like those of Heuermann, Litre, Garengeot and Bossu, appear to have reference only to encysted dropsies, or not to have been followed by a radical cure, while those of Warrick are too imperfect to claim any great degree of confidence. The patient cured by M. Vassal, (*Soc. de Méd. Prat.*, 1833, No. XII., p. 8,) by means of puncture, massage and irritations with the beak of a canula of a trochar, was followed by too many serious accidents to embolden practitioners to make trial of the remedy that saved her life. Nevertheless, it is not improbable that we may succeed ultimately in obtaining from these trials an important point in practice.

Reasonings based upon numerous facts induce me to believe that the cure of ascites only takes place by means of adhesion of the parietal lining of the peritoneum with the abdominal viscera. The colics which those who have escaped from this disease habitually experience, and the disturbance that they are troubled with in their digestive functions, would constitute the proof of my assertions. A man about fifty years of age, cured of an ascites fourteen years before, and who died of pneumonia at the Hospital of Tours, in 1817; and the young girl nineteen years of age, cured at fourteen years of age of a similar dropsy at the Hospital des Enfans, and who died in consequence of a cerebral lesion in 1824 at the Hospital of Perfectionnement, had both of them all the intestines glued together and to the walls of the abdomen by innumerable cellular lamellæ and filaments. Such being the fact, it remains to ascertain whether prudence and humanity would authorize us to imitate, under these circumstances, the processes of nature. With a view of elucidating this fact, M. Bretonneau and myself, in 1819, made some experiments upon dogs. We injected into their peritoneal cavity, first pure water, then brandy diluted with water, and finally water strongly impregnated with muriate of soda; but no inflammation could be excited in these animals, and all the liquids injected were absorbed at the expiration of a few days. A patient in whom there was no hope of effecting a cure by the usual remedies, and who was threatened with immediate death, was submitted to the same experiment. He died, but in consequence of his dropsy and from a portion of the liquid which had become effused into the substance of the walls of the belly having caused there a gangrenous erysipelas. M. J. Cloquet has frequently mentioned to me a patient in whom a vinous or alcoholic injection for congenital hydrocele had, contrary to his intentions, passed into the abdomen, but who nevertheless after some unpleasant symptoms was ultimately cured. Without wishing to deduce from those various trials conclusions which are not tenable, I nevertheless think them worthy of attracting attention. They go to show at least that injections into the peritoneum are not as formidable as is generally supposed, and that before passing upon them an absolute condemnation, it would be advisable to make them the subject of varied experiments and of an impartial and profound investigation. M. J. V. Roosbroeck, (*Rev. Méd.*, 1832, t. I., p. 250,) having been struck with the diuretic and sudorific property of the

*gaseous oxide of azote, (gaz oxidule d'azote,) concluded to inject it into the abdomen of dropsical patients after puncture.* Three patients, a man and two women, submitted by him to this treatment, derived such advantages from it that Broussais in his turn ventured to make trial of it, but in a patient who was in so desperate a condition that it was surprising to find he survived it even the period of eight days. The author puts two gros of nitrate of ammonia in a glass phial, to which he adapts a bladder with a faucet; lutes this apparatus and places it over the flame of an alcohol lamp; allows the bag to become filled with gas by the decomposition of the salt; unlutes it and waits until the whole has cooled; places the extremity of the faucet in the opening of the canula of the trochar, and then immediately proceeds to injecting it. If there is no error in the account of M. V. Roosbroeck, there is no doubt that practitioners should be solicitous to repeat his trials, which M. La Faye has also found reason to be satisfied with. From what I have seen of *iodine injections* in hydrocele and serous cysts, I am induced to believe that they would afford much better chances of success than wine, in ascites and cysts of the abdomen.

VII. *A bladder of gold-beater's skin.*—A bladder of gold-beater's skin, in the manner it is applied in the radical cure of hernia, as proposed by M. Belmas, introduced empty, then distended or filled with a suitable liquid while it is in the peritoneum or cavity of the cyst, and maintained at the outside by its extremity—could it have, as the author thinks, the advantage of graduating the irritation at pleasure, and of even suspending it if necessary by enabling us to withdraw the foreign body which has produced it? I would not dare to hope for this result.

VIII. On the supposition that nothing of this kind has been done, and that the *effusion has reappeared*, the puncture must be repeated again and as often as becomes necessary, proceeding in other respects according to the rules laid down above.

There are patients in whom life may be thus prolonged for many years, and in whom we have to have recourse to it every two or three months. Dropsy of the ovarium, which is a purely local disease in most cases, is the one which supports these repeated operations the best. Partial or encysted dropsy has also, in certain cases, been unquestionably benefitted by it; but it is doubtful if general ascites can be classed in the same category, or continue after the operation of paracentesis so long a time without terminating fatally. Thus, when we find it affirmed that puncture has been performed 9 times on the same woman by Saviard, 11 by Litre, 29 by Grew, 57 by Cheselden, 47 by Laub, 86 in the space of 26 years by Martineau, 52 by Schmucker, 65 by Mead, 100 by Callisen, 187 by M. Rolloff, (*Revue Med.,* 1826, t. II., p. 148,) in a woman who performed it upon herself 62 times, near 200 times in another case, (*Journ. Univ. des Sc. Méd.,* t. III., p. 119,) and even 655 times by Bezard, (*Bull. de la Soc. Méd. d'Em.,* No. 12, Dec. 1812,) and that the fatal issue of this malady has been thereby procrastinated, it is next to certain that the cases under consideration were dropsy of the ovarium and not ascites, properly so called. It was in the case of an ovarian cyst

that I was obliged to perform it 37 times in one woman, and 29 in another in less than three years.

### § III.—*Operative Process.*

*The various articles* are composed of a trochar of two lines in diameter, armed with its canula and besmeared with cerate; a tub or any large vessel whatever suitable for receiving the liquid; a smaller and deeper vessel which can be held near the belly, if the serum does not run with sufficient force to render it unnecessary; a portion of adhesive plaster; various compresses folded several times; a napkin in the form of an ecusson; another napkin folded in a triangular shape and with infra-crurals and its scapulary attached. *An assistant* is stationed near the head, and one towards the feet and the side upon which the patient is laid, in order to support his chest and the upper part of the thighs. A third stationed upon the opposite side, or even on the bed, should he apprehend that he may be otherwise too much fatigued, holds himself in readiness to place his hands flat-wise over the whole surface of the belly, in order to make gentle compression upon it in proportion as the liquid escapes. The surgeon seizes the trochar and plunges it with his right hand through the abdominal wall, the teguments of which he has kept stretched with his left. Forced in suddenly, and in an energetic manner, the instrument scarcely gives the patient any pain. Many authors, fearing that it might go too deep and wound some of the viscera, prefer introducing it gently while turning it upon its axis, and suppose that they escape still better by this means the danger of wounding any arteries. Arguments like these have no foundation. The organs of the lower belly are, as I have already said, too remote from its parietes in ascites, for the trochar to touch them, even though it should be plunged in up to its handle. Nor is there any greater necessity of obtaining a point d'appui with the two last fingers on the skin, while we are introducing it. Such precautions moreover are only calculated to render the operation more difficult and protracted. The forefinger or thumb elongated upon the stem of the trochar, while the palm of the hand firmly embraces the handle of the instrument, leaves naked only so much of it as we wish, and as is required for reaching the collection of liquid, and will secure us from wounding the viscera. Should the walls of the belly or cyst be one, two, or three inches in thickness, so much so in fine as to embarrass the operator, an instance of which Saviard states that he has met with; or should they be so flabby as to yield under its pressure, we would employ another instrument, and it would be under such circumstances that the bistoury or lancet might be substituted with some advantage. When there is no longer any resistance to the instrument, it shows that we have entered into the peritoneal cavity. The canula, which is to rest in its place with the mouth directed downwards, is held there by means of the left thumb and forefinger, while the trochar is being withdrawn from it. The liquid escapes immediately with more or less force, and with a jet which may then be readily directed into the tub destined to receive it. The blunt-pointed probe chest sound, &c., are only useful in cases where some foreign body

has got introduced into the canula. All the water being extracted, the operator withdraws the canula by rotating it on its axis, and at the same time supports by means of the two first fingers of his other hand, the periphery of the aperture he has made, to prevent the skin from being drawn upon it; applies over this point the plaster, and compresses; in this manner dresses the whole front of the abdomen and the sides; adjusts the body bandage and immediately places the patient in the middle of his bed, and in the position which is least fatiguing to him.

#### § IV.—*Accidents.*

Hemorrhage occasioned by puncture, though a rare occurrence, is however the inconvenience which has most attracted the attention of practitioners. M. C. Smith has collected ten examples of it. It is easily arrested when it arises from a wound of the epigastric artery, or any other vessel in the parietes of the abdomen. Various means are used for this purpose; one of them employed in the last century as recommended by Petit-Radel, and which M. Cruveilhier states that he has made use of with advantage, consists in including a large fold of the soft parts in the track of the trochar, then compressing it, and even making friction upon it slightly with the thumb and forefinger until the blood has ceased to flow. A small *plug of wax*, the extremity of a *rat de cave* candle, cut in the form of a peg, as recommended by Bellocq, or what is better still, a piece of gum elastic or plastic bougie, such as we make use of for the urethra, inserted into the wound in such manner as to fill it up exactly, is a resource which in this respect appears to me to leave nothing to be desired. I do not know however if a piece of prepared sponge would not answer still better. This substance, by imbibing the liquid at the bottom of the wound, would evidently make compression outwardly in the most advantageous manner; but it would also possess the inconvenience of being liable to be broken when it was found necessary to withdraw it. If the blood, instead of escaping outwardly, should have accumulated in the interior, it would be difficult to recognize it before death. In supposing moreover the contrary case, the surgeon would not be benefitted by it. What could he do under such circumstances, and where could he go to seek for the deep-seated vessel which furnishes the hemorrhage? We must not moreover allow ourselves to be imposed upon by appearances. We sometimes meet with, upon the surface of serous membranes, a sanguineous exhalation so abundant as to communicate to the water drawn from a dropsical patient, the dark color of venous blood; so much so that at first sight we might be induced to believe that it was blood instead of serosity which was running from the wound we had made. A striking example of this occurred in an adult affected with hydrothorax at the hospital of St. Antoine, in the wards of M. Rayer, while I had charge of the surgical department in this establishment, and there is no doubt that the same phenomena might take place in the peritoneal cavity. The hemorrhage mentioned by M. S. Cooper as resulting from a puncture upon the median line, might well belong to this description. Upon the supposition that the one which was

noticed at La Charité, in 1824, was not produced by a pure and simple wound of the epigastric artery, it might also be explained in the manner I have mentioned much better than by the alleged lesion of a mesenteric vessel. M. Piegagnel however relates an instance of a copious effusion of blood, caused, as he believes, by a puncture of an artery of the epiploon.

## ARTICLE II.—HUMORAL TUMORS OF THE LIVER.

Abscesses, hydatid cysts and encysted dropsy of the liver, have been for a long time, and are still regarded by many persons as placed beyond the reach of all surgical resources. The difficulty of recognizing them with certainty during life; the danger of producing an effusion into the peritoneal cavity, and allowing the action of the air on the walls of the collection, are the reasons why an artificial opening has been generally proscribed. There are, however, related instances of cures obtained by means of a puncture with the trochar, or by means of an opening made with caustic potash. On the other hand, the mode by incision having been the subject of special researches, and M. Récamier having succeeded in obtaining very fortunate results by combining those different resources, I have thought it proper to treat of them in this place in a separate article. Puncture alone would be insufficient should the cyst contain anything else than limpid serosity. Moreover, it would cause the effusion of a certain quantity of liquid into the belly, should there not have been established protecting adhesions around the part that is perforated. The employment of the bistoury would be still much more apt to give rise to the apprehension of this accident: it cannot be applicable except in cases where the diagnosis leaves no room to doubt the nature and anatomical relations of the cyst. Caustics, by acting too slowly, incur the risk, it is said, of general peritonitis, in consequence of the local inflammation which is produced by their application. A young lady, however, whom MM. C. Broussais, Sébillot and myself treated in 1838, by means of the free application of potassa, was perfectly re-established. In the process of M. Récamier, potash is first applied upon several points that are nearest to the morbid projection, in order that by their reunion they may make a large eschar, which is laid open at the expiration of a few days by means of the cutting instrument. Another portion of caustic is then applied to the bottom of the wound, and which is destined to act much rather in its depth than in its breadth. Repeated in this manner in succession, the cauterization is certain to promote the adhesion of the hepatic portion of the peritoneum with that of the abdominal walls, and enables us to plunge into the cyst either the trochar or the bistoury, as soon as the finger clearly recognizes the fluctuation underneath the incised eschar. After having extracted all the liquid, M. Récamier, imitating the practice of M. Billerey for empyema, substitutes for it *medicated injections*, which he renews every day, and which he retains in the morbid cavity, in the intervals between the dressings, by shutting up the wound with a pledget of lint or sponge. By this means the action of the air is prevented, the pus, diluted as soon as it is produced, cannot stagnate or pass into a pu-

trid state in the interior of the abscess, and the sac gradually shrinking upon itself, ultimately becomes transformed throughout its whole extent into a simple fistula, which, in its turn, may be healed up. Can it be necessary to add, that the same treatment is applicable to tumors in the *gall bladder*, as soon as they are placed under the conditions laid down and so well described by J. L. Petit? To elucidate the diagnostic in all the affections under consideration, we are frequently obliged to make an *explorative puncture* by means of a small trochar or cataract needle, in the same way, for example, as when we wish to distinguish with certainty between an aneurism and an abscess. M. Récamier justly remarks that, in this case, the instrument should be very delicate, and suddenly withdrawn from the tissues. Unless this were done it might make a wound which would give ready egress to the liquid, in such manner as to cause it to be effused into the abdomen or in the surrounding organic tissues. Another mode of opening into morbid collections of the liver or abdomen, and which was proposed in 1827 by M. Graves, (*Arch. Gén. de Méd.*, t. XVIII., p. 295,) is worthy of being placed alongside of the preceding. This surgeon employs the bistoury only. After having freely incised all the tissues, as far down as to within one or two lines of the abscess, he stops and fills the wound with lint, and waits until the tumor shall open of itself, at the bottom of the wound, during a paroxysm of coughing, &c. M. Bégin (*Journ. Hebdom.*, 1830, t. I., p. 417,) has since proposed, for all purulent abdominal collections, that we should proceed in this manner, layer by layer, down to the peritoneum, and stop there should there be no adhesion, but, in the contrary case, to penetrate into the cyst. Should the tumor be still free, the wound of the peritoneum, which it immediately tends to fill up, speedily agglutinates with its anterior surface, and three or four days after we may plunge in the instrument in this part without any danger to be apprehended from effusion into the belly. Facts, sufficiently conclusive, have been related in England and in France, in favor of this ingenious method, and I have had recourse myself to it in three instances with advantage.

### ARTICLE III.—CYSTS AND TUMORS OF THE OVARIUM AND OF THE LOWER BELLY.

*The ovary* is frequently the seat of a degenerescence, which has been pointed out by authors of every epoch, but for which no one scarcely proposed to procure relief by means of a cutting instrument until about a century since.

#### § I.—Appreciation.

Le Dran, Housson and Gärnegeot had already remarked that puncture scarcely ever succeeds in this affection, while it is sometimes cured by freely incising the cyst. The patient of M. Holscher (*Arch. Gén. de Méd.*, 1838) was cured after puncture, by means of an injection of two litres of wine. Morand maintains that extirpation of the diseased organ should be performed at the very first.

**A. Successful Results.**—Facts communicated by Delaporte and Lieutaud were adduced in favor of this operation, the process of which had already been given by Thumin, and which two English physicians, Power and Darwin, hastened to advocate with zeal; but in spite of the efforts of M. Ischier, (*Thèse de Montpellier*, 1807,) the successful result attained by Laumonier, the cure of Mdme. de Choiseul, and the similar result related by M. Kapser, the proposition of Morand, nevertheless, remained without any adoption in practice, until M. Lizars (*Bull. de Fér.*, t. IV., p. 144,) undertook to recall attention to it in 1825, while on their part MM. McDowell, Nathan and Alban Smith, (*Journ. des Prog.*, t. V., p. 273,) made trial of it in America, and MM. Dieffenbach, Chrysmer (*Bull. de Fér.*, t. XVIII., p. 86,) and Martini sought to render it popular in Germany. At the present day the operation has been performed a sufficient number of times to enable us to appreciate the extirpation of the ovaries at its just value. Leaving aside the operation as formerly performed by Lemman, the one published by M. Lafflise of Nantes, and another which belongs to Delpech, I will confine myself to an enumeration of the most important cases. The tumor removed by M. McDowell from Mrs. Crawford in 1809, weighed 15 pounds, and the cure was completed on the 35th day. In another patient, M. McDowell finding both ovaries affected, made his incision upon each; a quantity of blood was effused into the belly, but the operation, nevertheless, was attended with entire success. In 1816 he removed an ovary from a negress, which weighed six pounds, but which was also followed by a perfect cure. Two other women whom he treated in the same manner were not so fortunate; one remained in feeble health and the other died. Dzondi in one instance succeeded by means of an incision, the employment of tents, and afterwards by extirpating the mortified cyst. Pure and simple extirpation performed in a case in 1821 by M. Smith, was not followed by any accident. The tumor removed by M. Lizars on the 27th of February, 1825, was as large as a fœtus at the full term. It became necessary to prolong the wound of the belly from the xiphoid appendix down to the pubis. The other ovary was also affected, but the patient, who was 36 years of age, nevertheless ultimately recovered. Dr. Chrysmer, sent for to a woman 38 years of age, had every reason to be satisfied with his resolution to perform the operation: at the expiration of six weeks the patient was in a condition to return home. M. A. Smith operating on the 6th May, 1822, on a young lady, extracted the cyst after having taken six pints of liquid from it, and after having strangulated it at its base by means of a strong ligature, which came away at the expiration of a month and a half. In 1824 this lady was still in the enjoyment of the most perfect health. M. Jeaffreson (*British Annals of Med.*, vol. II., p. 140,) incised the cyst, extracted twelve pounds of serum, drew it outwards and extirpated it, and also cured his patient. M. King (*Ibid.*, vol. II., p. 141,) obtained a similar successful result. In the case of M. Weitenkampff, (*Encycl. des Sc. Méd.*, 1836, p. 312,) a spontaneous opening in a similar cyst into the vagina was also succeeded by a cure. M. Quittenbaum, (*Ibid.*, p. 306,) in extirpating the tumor, after having extracted from it 20 or 30 pounds of liquid

by puncture, even alleges that he effected a cure of his patient in the space of ten days! After numerous punctures, M. Rogers (*New York Med. and Phys. Journ.*, 1830, p. 285,) extirpated the cyst and succeeded. The same result followed in the case of M. Ehrharstein, (*Arch. Gén. de Méd.*, t. I., p. 427; *Méd-Chir. Rev.*, July, 1833, p. 242,) who removed in this manner a degenerate tumor of the ovary, and in that of M. Ritter, (*Tahère Thèse*, No. 85, Paris, 1839,) who was no less fortunate.

B. To these cases of actual extirpation, followed by a successful result, we have to add others in which the *tumor was not entirely removed*, and where the operation was not completed in the manner proposed before commencing it. It was in this way for example, that M. Lizars, finding a simple adherent mass in front of the sacroiliac-symphysis, instead of an enormous cyst as he had at first supposed it to be, deemed it proper to restrict himself to the first stage of the operation, that is, to the incision of the parietes of the abdomen; immediately closing up the wound, he considered himself sufficiently fortunate in saving the life of his patient. In another case, M. Granville, (*Journ. des Progr.*, t. I., p. 274,) perceiving that the cyst could not be detached from the surrounding parts without difficulty, confined himself to laying it open freely, and carefully emptying it. By this course he obtained complete success. M. Dieffenbach, alarmed by the size of the base of the tumor, and of the vessels it contained, and seeing moreover that blood only issued from a puncture made in its centre, did not venture to remove it, and immediately united the wound, when the patient also recovered.

M. Galenzowski, (*Journ. des Progr.*, t. XVIII., p. 222,) also perceiving that the tumor was too adherent to be removed, emptied it by a large opening, broke up its different cells, traversed its deep-seated wall with a thread, drew it towards the wound in the abdomen to prevent all effusion into the peritoneum, closed up in the best manner he could the incision in the abdominal parietes, and obtained in this manner a perfect cure in the space of a few weeks. M. Mussey, (*Gaz. Méd. de Paris*, 1838, p. 393,) who after having freely incised the walls of the abdomen, confined himself to the puncture of the cyst, and afterwards the employment of a meche, also succeeded. M. King, (*Press. Méd.*, t. I., p. 634,) who, deterred by the fainting of the woman in one case, and from not finding in another any tumor in the belly when he had introduced his hand there, closed up the wound by suture and had no serious accidents follow! M. Dohlhoff, (*L'Expérience*, t. I., p. 634,) after having made an incision of five inches, and finding no description of tumor, also closed up the wound and saved his patient!

C. *Failures.*—Other trials have been less fortunate. A woman 40 years of age, operated upon on the 20th September, 1822, by M. McDowell, died on the morning of the 24th. M. A. Smith, deterred by the intimate and very extensive adhesions of a tumor of the ovary, in a patient who herself had punctured it more than 80 times, restricted himself to the incision of the walls of the belly, and did not dare to terminate his operation. He had the misfortune, however, to see this lady perish on the 42nd day. The patient operated upon by M. Lizars on the 22nd March, 1825, died on the second day

after. The one which was operated upon by MM. Hopfer, (*Bull. de Fér.*, t. XVIII., p. 86,) and Chrysmer, survived only 36 hours. Another operated upon by M. Chrysmer himself was not less unfortunate. The young girl whose case is given by M. Martini, also died at the expiration of 36 hours. The patient operated upon by M. Warren, died at the end of three hours, and M. Dohlhoft, (*L'Expérience*, t. I., p. 625, 626,) who, though the special pupil of M. Dzondi, never heard him speak of the successful results that M. Lizars imputes to him, speaks: 1st, of a woman operated upon by him, and who died of peritonitis in 36 hours, (*Ibid.*, p. 630;) 2nd, of a female operated upon by M. Grath, (*Ibid.*, p. 631,) who died from hemorrhage at the expiration of sixteen hours; 3rd, of another in whom he opened the belly, and who had the epiploon cribbled with tumors, and who died eight hours afterwards, (*Ibid.*, p. 633,) without of course the operation being carried any farther. M. Key, (*The Lancet*, 1828, vol. I.,) in a case in which he employed puncture and a tent, did not succeed. M. Kapser obtained only one cure out of three cases. A woman in whom the cyst was of the size of the uterus in the eighth month of pregnancy, and in which M. Récamier (*Revue Méd.*, January, 1839,) made a puncture in order to introduce a meche or seton from above downwards through the vagina, also died. M. Marjolin, (*Thaère Thèse*, No. 85, Paris, 1839,) who confined himself to an injection of sweetened barley water, was no less unfortunate.

**D. Real Value.**--Extirpation of the ovary, though dangerous, is nevertheless a resource which requires examination. The ovary is not so indispensable to the existence of life that a woman cannot be deprived of it without very great danger. The gelders of beasts remove them without any apprehension during the first weeks of the life of the animal, in the female of the hog, and I am enabled to assert that in their hands this operation is scarcely ever followed by any accidents. Diemerbroeck relates, that according to Atheneus, Adrametes, and according to Suidas, Gyges, king of Lydia, treated the women in their kingdom in this manner. Alexander-ab-Alexandro says the same of the Creophagi and the Egyptians. Wierus states that a gelder suspecting the chastity of his daughter, opened her belly, and drew the womb to the outside in order to excise the two ovaries, and that this cruel operation was followed with complete success. Franckenau, Pott, Lassus, (*The Lancet*, 1828, vol. I., p. 878,) and M. Deneux, each relate an instance of extirpation of the ovary, which did not prevent the females from afterwards enjoying excellent health.

*In conclusion*, the operation is not in itself either delicate or difficult. The occasions for performing it are unfortunately but too frequent. The diseases which require it, if left to the resources of the system, almost always terminate in death. But also, in order that there should be any chance for success, it is necessary that the tumor should be movable, that it should not adhere to the intestines, that it should be susceptible of being detached with facility from all the abdominal organs, that it should have a root or pedicle of small size, and that it should not expose to the risk of wounding vessels of too large a calibre. It is necessary also, that it should be susceptible of being

recognized and distinguished from every other disease, which is far from being always an easy matter. In the beginning, how can we avoid confounding it with some tumor or other attached to the uterus, the iliac fossæ, &c.? Moreover, who would then dare to propose to extirpate it? At a later period, when it occupies a large extent of the abdomen, the new relations contracted by the organs which surround it, and the almost inevitable adhesions of its periphery, would render its dissection and ablation, if not impossible, at least exceedingly dangerous. Finally, though incurable in its nature, it does not generally cause death until after a long protracted period. As a medium term, its duration is usually prolonged, not to 12 years, as M. Corbin thinks, but 5 or 6 years in women who are affected with it. Nevertheless, if as happens often in such cases, the general health has been preserved in a manner which contrasts strongly with that of the diseased condition of the abdomen; if the issue of an unctuous or gelatinous liquid obtained by means of an explorative puncture, demonstrates that the disease is situated in the ovary; and if the tumor does not exceed the size of the head of an adult, and the patient ardently desires the operation, it ought in my opinion to be undertaken. Only that it remains to determine if the simple incision according to the rules laid down in the preceding article, made trial of by Portal and Denman, (whose cures however are doubted by M. Key,) and by MM. Ray and Ramsden, who have also, it is said, each obtained a cure by this mode, ought not to be preferred to extirpation, properly so called.

## § II.—*Operative Process.*

The woman placed upon her back, with her lower extremities moderately extended and held by assistants, should be adjusted in such manner that the most prominent portion of the cyst presents itself to the operator. This last first makes, in a direction parallel to the axis of the body, an incision from four to six or eight inches long upon the most suitable part of the abdomen, makes use of the forefinger of his left hand to guide the bistoury, as soon as the peritoneum is opened, and then occupies himself with the tumor. Should it be free and movable, and easily isolated, and have a narrow pedicle, the surgeon has nothing more to do than to tie a ligature firmly around its root, and to excise it upon the outside of the constriction by means of the bistoury or scissors. Should the adhesions which unite it to the surrounding tissues be loose or easily destroyed, he detaches them by means of a careful dissection, and proceeds in respect to the remainder of the operation as in the other case. Should it prove to be fungous, and to have a large base and blood-vessels of considerable size, it would be better not to meddle with it and to close up the wound immediately. Should its adhesions to the wall of the belly not admit of its removal, we should plunge the bistoury into it, and lay it open freely in such manner as to empty it entirely, and that the cyst may afterwards be gradually drawn into the wound of the abdomen. The position, adhesive plasters or the suture will be used according to the nature of the cases, to reunite the wound, which moreover should be dressed in the simplest manner possible. When

the solution of continuity has been very extended, the intestines have so great a tendency to escape externally, that the suture then becomes almost indispensable. The same takes place nearly in all cases, where in order to remove the tumor, it has not been necessary to lay it open, nor to occasion any very great destruction of parts in the interior of the belly. It is directly the reverse when we have only emptied the cyst, or have not had it in our power to extract all that we wished to remove. Upon the supposition that we purpose to confine ourselves to the incision, it would be necessary to put ourselves on our guard at first, against effusion, and to encourage the previous formation of protecting adhesions, if they did not already exist, between the morbid mass and the parietes of the abdomen; and finally, to act in the same manner as in the case of an abdominal abscess or hepatic collection.

#### ARTICLE IV.—TUMORS OF THE ABDOMINAL PARIES.

M. MacFarlane, (*Encyclog. de la Sc. Méd.*, 1836, p. 54,) who states that he has removed with success an hydatid tumor in the iliac region, was less fortunate in two other cases. Entering through the puncture into a cyst, between the peritoneum and the muscles, death took place on the fifth day. Compelled to remove the ends of the two last ribs with a fibro-cartilaginous tumor which had become developed between the muscles, he had the misfortune to lose this patient by peritonitis at the expiration of thirty-one hours. In the case cited by M. Basletta, (*Bull. de Fér.*, t. X., p. 95,) the removal of the cyst, containing a pulpy substance analogous to that of the testicle, and which communicated with the peritoneum, was followed however by the cure of the patient. It was the same with the cyst in the case mentioned by M. Dufau, and which burst during an effort made by the patient. M. Monod has shown me a neuromatous or atheromatous mass of the size of a large fist, which he had successfully removed from between the abdominal muscles; but I have mentioned, under the chapter on tumors in general, and of tumors of the abdomen in particular, what ought to be the special operative process in cases of this kind. The important indication is to avoid the peritoneum. Should it have become necessary to wound this membrane, we must be guided by the rules laid down for the operation for strangulated umbilical hernia, the Cesarean operation, or that employed in cases of cysts of the ovaria, &c.

[*Ovariotomy*.—The results of the latest researches and examinations of comparative statistical tables on this subject, as furnished by MM. Jeaffreson, (*London Med. Gaz.*, October, 1844,) B. Phillips, (*London Medico-Chir. Trans.*, vol. XXVII., 1844.) Chereau, (*Journ. des Conn. Méd.-Chir.*, Juin, 1844,) F. Churchill, (*Dublin Journal and Archiv. Gén.*, 4e série, t. V.) and Emiliani, (*Giornali dei Progressi*, January, 1845,) seem to admit of our establishing the following conclusions, deducible from about one hundred cases in which the operation has been performed, up to the present year, 1846, (see *Archiv. Gén. de Paris*, Fevrier, 1846, 4e série, t. X., pp. 216—219.)

1. That the operation is practicable, and even easy, in most instances.
2. That it has received unmerited reproach, in consequence of enu-

merating under its failures those cases which have been abandoned, and in which the operation has been left unfinished, from the operator having ascertained that his diagnosis was false and the adhesions too extensive, (see Jeaffreson, *supra cit.*) 3. That the most favorable indication for it is the existence of liquid, and especially *monolocular* tumors, in which the whole contained fluid may be readily evacuated by paracentesis as often as it forms, but which therefore, for the same reason, are those in which it is least called for. The next most favorable, and where, however, it is at the same time most required, are the *multilocular* liquid tumors, because here the puncture can have but little, at least only a partial and temporary effect. Again, it is in a great measure contra-indicated, and ought to be forbidden, as we think, in solid or sarcomatous or fibro-cartilaginous ovarian tumors, from the very extensive nature of their adhesions. Nor do we except, with Dr. Jeaffreson, from this remark the cases where such tumors lead to consecutive ascites, threatening a fatal issue. 4. The larger the incision, the less the chances of cure; and the smaller the incision, the more the prospect of a successful issue, even though to facilitate this last, the cyst has to be punctured before it is extracted. 5. The proportion of deaths is in the ratio of 49 out of every 100 cases operated upon, i. e. 49 deaths and 51 cures, which is a relative mortality not much greater (*Arch. Gén.*, *ibid.*, loc. cit., t. X., p. 219,) than that of *amputation of the thigh*. But we are to deduct in part from this estimate, and in favor of the operation, the fact, that in 18 cases out of the 100, the operation had to be abandoned, which of course, in some degree, augmented to the same extent the chances of a fatal issue; while, on the other hand, there was a *false diagnosis* in 7 out of the same 100 cases. 6. That so far from adopting the precept of Dr. Jeaffreson, that the operation may be *justifiable* where the size of the tumor gives rise to great annoyance or inconveniences, or to such functional derangements as threaten a fatal issue, we do not think that it would even then be admissible, except under very peculiar and very unusual circumstances. 7. That, on the contrary, we coincide with the reviewers of the *Archives Générales*, (t. X., loc. cit., p. 219,) in language which seems also wholly congenial with the text of our own author: that the *extirpation of ovarian cysts*, though it cannot be absolutely rejected, can be had recourse to only in cases that are wholly exceptional and excessively rare, and where every other known therapeutic means has been exhausted. T.]

#### ARTICLE V.—FISTULAS IN THE STOMACH, (Fistules Stomacales.)

Having elsewhere spoken of foreign bodies in the abdomen, and having yet to speak of gastrotomy and stercoral and urinary fistulas in the chapters which are to follow, I have but a few words to say in this place on the subject of stomachic, biliary or renal fistulas. An instance of stomachic fistula has been published by M. Stokes. (*Arch. Gén. de Méd.*, 2e série, t. VI., p. 430,) and M. Beaumont (*Journ. de Prug.*, t. XII., p. 254,) has related another. M. Lowel (*Bull. de Fér.*, t. VI., p. 157,) states that he saw a similar result in one of his patients, produced by a gun-shot wound, and M. Cook, (*Arch. Gén. de Méd.*,

2e série, t. VI., p. 430,) alleges that he cured one in fifteen days by means of compression; but I am not aware, up to the present time, that the slightest operation has been attempted for this description of fistulas, which, moreover, are quite uncommon. We might, however, I think, have recourse, with some prospect of success, either to the simple suture or to one of the modes of anaplasty described elsewhere, and which I shall recur to in treating of artificial anus. As to biliary fistulas, an instance of which has been given by M. Civiale, (*Gaz. Méd.*, 1832, p. 130,) and renal fistulas, of which I have met with three examples, they are produced either by calculi, or some other lesion either of the gall-bladder, or of kidney or its pelvis (bassinet,) which must first be relieved before we proceed to their treatment.

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## PART FIFTH.

### HERNIA.

#### CHAPTER I.

##### HERNIA IN GENERAL.

###### ARTICLE I.—ANATOMICAL REMARKS.

A hernia, of whatever description it may be, presents two points for consideration,—its envelopes, and the viscera which constitute it.

###### § I.—Viscera.

There is no organ in the belly which may not, under certain circumstances, form a hernia. They are not all of them, however, equally liable to strangulation. Thus the bladder, ovaria, uterus, spleen, and liver, have been seen either together or separately in a hernial tumor. But it can scarcely be conceived that these various organs are of a nature to undergo strangulation. An intestine, on the contrary, as soon as its calibre is interrupted in any point whatever, must necessarily give rise to many serious symptoms. The constriction of the epiploon does not, however, admit so ready an explanation of these phenomena; but whether this depends upon tractions made on the stomach and large intestine, or upon a sympathetic reaction transmitted through the branches of the trisplanchnic nerve, experience has shown that they may be developed under such circumstances, and that this fact must be admitted.

###### § II.—Envelopes.

The coverings in every hernia comprise as their essential elements, the integuments, the sac, and the intermediate layers. The skin presents nothing remarkable, except in relation to its different conditions of thickness, density, and adhesions. It is entirely different with the sac.

*A. Sac.*—The name of sac is given to that portion of the perito-

neum, which is protruded by the viscera outside of the belly, and which forms the first covering of the hernia. The ancients had very confused ideas upon this subject. They supposed that the descents or *hargnes*, (*hernias*,) which they also called on that account *ruptures* or *rompures*, were produced by means of a laceration of the peritoneum. At the time of Dionis, it is true, this error no longer existed, and the existence of the hernial sac was already admitted in the majority of cases; but it was not until the time of Mauchart and Arnaud, about the middle of the last century, in fact until the time of the Academy of Surgery, that the sac was considered an integral part of every description of hernia, so that at the present day its presence is always deemed essential.

I. I am in an error, for the *moderns* acknowledge that hernias resulting from wounds penetrating into the abdomen, the Cesarean operation, a ligature upon the iliac arteries, and gastrotomy, may in general be destitute of this sac. Nor does a hernial sac exist when the bladder is displaced at its anterior surface, or the cæcum upon the part at which it is adherent. This is a fact which M. Colson of Beauvais has demonstrated in opposition to the opinion of Scarpa, who entered into a long discussion to prove the contrary. We will remark, however, that under this last point of view, it is rather a dispute about words, than a real difference of opinion. Scarpa, in maintaining that cæcal and vesical hernias possess a sac, only wished to say in fact, that a greater or less extent of the displaced organ remains free in the tumor, and that a prolongation of the peritoneum is found there as well as in ordinary hernia. But M. Colson does not pretend to deny this arrangement; he alleges only, that inasmuch as the hernia is adherent in the greatest extent of its surface, we cannot give the name of sac to the portion of peritoneum which covers the remainder of it. Some persons, on the other hand, consider that hernias which are caused by traumatic lesions of the abdomen, have a sac as well as the others, unless they are not protruded before the complete cicatrization of the wound of the peritoneum. It is a question, however, which does not appear to have been considered in a correct point of view.

II. When a *perforating wound* closes up and is cured, there is ordinarily produced by it a cicatrix, which has less thickness, and is less resisting than the natural walls of the abdomen. The explanation of this is not that the two lips of the peritoneum are not re-united, but because, in place of muscles and aponeuroses, there exists in this part only a fibro-cellular tissue of new formation. If then a hernia should be formed here, whether it protrudes the cicatrix before it, or does nothing more than to displace it, in order to arrive externally, we cannot perceive how it can fail of being surrounded on every side by the peritoneum, and of possessing a true sac. But this cicatrix may to some extent remain independent of the serous abdominal layer, as it may happen that the peritoneum may have adhered so closely to the borders of the wound, which allows egress to the viscera, that the hernia shall have no sac.

III. What takes place in this case is also noticed at the *umbilicus*. I am perfectly satisfied, from dissections, that umbilical hernias (*exomphales*) do not usually have an internal tunic which can be separated

from the other envelopes. The smooth layer (*la couche lisse*) which has been taken for this, is intimately united with the external tissues, and has been developed by dilatation, and not by displacement of or traction upon the peritoneum. These facts authorize me to establish: 1st, either a *true* sac by transposition of the peritoneum; 2d, a *false* sac by simple *distension* of this membrane or of any other description of cellular tissue; 3d, an *incomplete* sac in vesical, and in cæcal and hernias, &c.; that is to say, that the hernial pouch is lined throughout with a true serous *membrane*, in the vast majority of cases, in some others but partially only, and that in a very small number what we see in its interior is only a simple surface in place of a *membrane*.

IV. The form and size of the sac vary in an almost infinite degree. Hemispherical, globular, pyriform, bosselated, conical, cylindrical, bisacculated, with a duplicate, triplicate, or quadruple neck, &c., it may scarcely exceed the size of a small nut, or be as large as that of the head of an adult. Its *internal surface*, which is smooth and moist, does not differ from that of serous membranes in general. Its *external surface* requires a little more attention. In the true sac it is lined with a cellular layer, which necessarily plays an important part in the history of hernias. Being a portion of the *internal fascia superficialis* or of the *fascia propria* of the peritoneum, this layer exists everywhere, but under different conditions of laxity, thickness and adhesions, which are exceedingly dissimilar upon various points of the abdominal cavity. It is in this that we meet with the vessels which are generally referred to the peritoneum, and it is this membrane which, by its induration or gradual thickening, produces what is called the *épaississement* of the sac, and which, after having undergone a filamentous or semi-fibrous transformation, gives rise, when it is torn, to the bosselated or irregular appearance presented upon the external surface of certain hernias, and it is this membrane also which may be the seat of inflammations, suppurations or morbid alterations of every kind. From this in fine come the great majority of vessels which ultimately terminate beneath the skin after having traversed the muscles and aponeuroses, and it is this membrane upon which are found those small adipose masses which gradually escaping through the vascular orifices of the fibrous or muscular layers of the walls of the abdomen, ultimately, in certain cases, produce a projection under the integuments and lead to the erroneous supposition of the existence of hernias, properly so called. Around a false sac this layer intimately blended with the surrounding lamellæ, distinguishes it from the preceding, and is so constituted that in place of a membrane which may be *isolated*, it presents only a surface wholly incapable of being detached. The name of *neck* which is given to the portion of sac which is confined in the hernial opening, might be advantageously replaced by that of *root*; for the first involves the idea of a *strangulation*, which is far from always existing, while the second, which is equivalent to the word *origin*, would in all cases precisely express the thing intended. The neck of the sac then, and I speak of the true sac, and which is generally narrower than the body and bottom of this pouch, is quite frequently folded or gathered up like a purse in the ring which encloses it. Should the hernia be ancient or the folds have remained a long time in contact, it is readily conceived

that they might become agglutinated and impart to the neck under consideration, a considerable degree of thickness and resisting force.

V. The existence of several necks in one hernia, which had already been sufficiently well explained by Arnaud, and afterwards by Pelletan and Scarpa, is no longer a matter of obscurity or surprise since the labors of M. J. Cloquet. Suppose that a hernia, after having been a long time reduced, should afterwards reappear, and that the neck of the first sac being too narrow to give passage to the viscera, shall have been protruded by them at the same time that they draw down another portion of peritoneum and give rise to the formation of a new neck; should the same thing happen a second, third or fourth time, we shall have produced a sac in the shape of a chaplet with numerous necks. When the first adheres strongly by a portion of its periphery to the neighboring tissues, it is possible that the other may only cause that to deviate, in place of forcing it to descend before it. In this *double sac (bissac)* the two pouches are in front or by the side of, and not below each other. The production of such necks is also possible where the hernia has not been reduced. This then constitutes a new protrusion, which is situated above the ancient one.

VI. The *adhesion of a cord* or of a portion of the epiploon to the bottom of the primitive sac, is one of the most favorable circumstances for the formation of a second neck. Pelletan mentions a case in which the epiploon traversed in this manner three contracted passages, in order to fix itself to the bottom of the lower sac. I have met with an instance in every respect similar, another in which the upper sac also contained a noose of the intestine, and in 1832 another still at La Pitié, which scarcely differed from the first. As to the numerous necks of bosselated sacs, they are formed in a manner altogether different. These latter are simple hernias of the sac, through lacerations of the *fascia propria*, or of any other fibrous layer which should have taken its place. The sac, instead of necks, may be divided by actual septa and form one or more independent cysts below that portion which continues to retain the viscera. A striking example of this I saw in the patient operated upon by the process of M. Belmas.

B. *Aponeuroses*.—The tissues which separate the sac from the cutaneous layer necessarily vary according to the seat of the hernia, and could not be studied with advantage except in each particular hernia. I have therefore no occasion to speak at the present time of any other than the common cellular tissue and the superficial or *sub-cutaneous fascia*. When there are neither aponeuroses nor muscles interposed, the *fascia propria* and the *fascia superficialis* ultimately become blended in the thickness of the hernial pouch; that is to say, that we can no longer distinguish any separation between the cellular lining of the skin and that of the peritoneum.

C. *Hernial Openings*.—The openings which allow of the formation of abdominal hernias are of various kinds. Some which are accidental lacerations, as occurs in persons in whom the belly has been excessively distended by pregnancy, ascites or any tumor whatever, &c., rarely give rise to strangulation. The same remark is applicable, in a great extent, to those which result from a penetrating wound of the abdomen.

There are others also which do not require any farther consideration. The orifices which are here and there found upon the different fibrous layers of the oblique or transverse muscles for the passage of vessels of the third order are of this description, and present moreover this remarkable feature, that the masses or adipose tumors whose pedicle they embrace, and which augment in size under the skin and in the other direction are attached to the peritoneum, may dilate these openings and by degrees draw a portion of the peritoneum into them in the form of a sac or finger of a glove, in which the intestine in its turn may ultimately become lodged or even strangulated, and thus constitute a description of hernia which is very embarrassing to the practitioner who shall not have been aware of its possibility.

Those which it remains for us to speak of are arranged under two orders: these are either simple *openings* or *rings*, or passages of greater or less length and obliquity, and very generally known at the present day under the name of *canals*. At the umbilicus, for example, the opening is always annular, while at the fold of the groin it is generally canalculated.

I. *Rings*.—The first species is not met with except upon those points of the abdomen where the aponeuroses and muscles do not form distinct layers, as at the linea alba, upon the side, and at the vagina, rectum, &c. From these parts, in fact, being incapable of becoming separated, and admitting only of an opening for the passage of the viscera, the hernia arrives under the skin immediately after having passed through them, and escapes in reality only through a simple circle before it is formed.

II. *Canals*.—The second kind of hernial opening is more complicated. Its internal and its external extremity represent two distinct circles or two rings, which are sometimes separated at a considerable distance from each other. It is found only at those parts where the different layers of the abdominal parietes are naturally liable to become separated. In the normal state it is usually occupied by vascular, nervous, or any other description of cords. Its track, which may be allowed to have walls, is caused by its two orifices being kept more or less widened by the muscles or other tissues, and by its two rings belonging to two different descriptions of aponeurosis. If its internal and external openings are exactly opposite to each other, the canal is straight or perpendicular. On the contrary, it is oblique when they are situated at an unequal distance from the median line. It is to be added, however, that hernias, provided they have existed ever so little time, have a tendency to obliterate the obliquity and canalculated form of the openings under consideration, and to transform them all into simple rings by a process which is easily explained. The deep-seated and the superficial aponeurosis being pressed upon in an opposite direction by the portion of organs which has obtruded, and by that which still has a tendency to make its escape, gradually obliterate the interval which naturally separates them, and are ultimately found in contact. An oblique hernial canal, taken in its ensemble, is sufficiently well designated by the shape of an elongated Z. Now it is evident that the viscera which occupy a canal of this description, naturally tend constantly to straighten it by their own

weight, and to bring its two openings in face of each other, and that afterwards they may, as in the preceding case, conglomerate them into the condition of a ring, which is almost perpendicular. A hernial opening, however, whether it be a circle or a canal, almost constantly flares open in the manner of a funnel in the direction towards the abdomen, more so in some persons and less in others. As on the other hand, the vessels which are sometimes found in the neighborhood of the neck of the hernia are usually situated in the substance of the fascia propria, that is to say between the peritoneum and deep-seated aponeurosis, it results from this, that they are generally found pushed back to the distance of at least two or three lines from the fibrous border, which causes the strangulation, and upon which we are compelled to act with a bistoury in order to overcome the débridement.

## ARTICLE II.—RADICAL CURE OF HERNIA.

Whatever may be the seat of the hernia, it always forms an infirmity if not a disease sufficiently alarming to have urged persons at every epoch not only to seek a palliative for it, but also to effect its radical cure. The singular idea which induced the ancients to rank it among immoral diseases, a notion which is still so prevalent that country people frequently struggle in secret against the symptoms which it may give rise to before complaining of them to the physician, constituted an illusion which charlatanism naturally converted to its advantage. Hernia also has had, since the time of Hippocrates, Galen, and Celsus, as it also still has at the present day, pretended curers and *hernial* physicians who are exclusively occupied with the treatment of this disease. It would be unjust however to censure indiscriminately the numerous trials that have been undertaken to accomplish its radical cure, even since art has been in the possession of valuable means for retaining it. Laboring persons and workmen, who in general are most liable to it, derive but little advantage from palliative means. The most perfect bandages are far from procuring among them the beneficial results that are obtained from them in the elevated classes of society. The pelote almost always escapes from the abdominal ring at the expiration of a few days or weeks, and frequently the entire truss soon becomes nothing more than a new source of dangers.

### § I.—*Topical Applications, Compression, Position.*

The *emplastrum contra rupturam* of the ancients, the brick cerate (*cérat de brique*) of J. Fabricius, the vinegar bags of Verduc, the sandal wood, tormentil, turpentine, and topical applications of Babynet and Mlle. Devaux, the famous remedy of the Prior of Cabrière, a remedy which consisted of an astringent plaster applied over the hernia, and muriatic acid given internally; the cataplasm of iron filings while diamond was administered internally, as recommended by A. Paré, after the advice of Guy de Chauliac; the decoction of dog-grass and spurge laurel, as used by Arnaud; the carbonate of ammonia mentioned by M. Belmas, and a thousand other remedies

of the same description, no longer find any advocates at the present day, except among quacks and old women.

### § II.

It is not altogether the same with *compression*, which has been successively lauded by Celsus, Theodorus, Aetius, G. de Salicet, Norsia, Bleghny, Trecourt, J. L. Petit, Juville, &c. Steadily persevered in and applied in a proper manner, it has frequently effected a radical cure, without being under the necessity for this result of carrying it so far as to produce the gangrene which has been recommended by some in Germany. M. Fournier, M. Beaumont, and M. Duplat, have endeavored to bring it into repute among practitioners, while maintaining that if it is combined with astringents, it may cure almost every description of hernia.

### § III.

M. Ravin also expresses a positive opinion, that topical astringents and compression may effect a radical cure of hernia at every period of life. But with him these means are only secondary, the base of his method being the horizontal *position* of the patient during several entire months. The observations of Rivière, F. de Hilden, Renaume, Arnaud, and Hey, and the thesis of Rieck, show all the advantage that may be derived from the treatment proposed by M. Ravin, and which it was said was in general use in Denmark at the time of Winslow; but besides the uncertainty of success, what patient would consent to remain in his bed for six months or a year, for a tumor which is so easily kept up by means of a simple bandage? The examination of these different remedies however, belonging to pathology properly so called, I can speak of them only in a cursory manner, without pretending to appreciate their value or disadvantage. They have moreover attracted much attention since I called the attention of surgeons to them in the first edition of this work.

### § IV.—*Various Operations.*

The principal operations which have been employed in practice for the purpose of obtaining a radical cure of hernia, are cauterization, the ligature, the suture, incision, excision, scarifications, dilatation, and the closing up of the ring.

A. *Cauterization*.—If all that were necessary to proscribe an operation were to point out its dangers, and to demonstrate its inutility, cauterization, which was so frequently employed at the time of Albuscasis, Roger, and Guy de Chauliac, would not have been extolled by so many practitioners at different epochs. But by denying the successful results that it has in reality procured, and by attaching no importance to advantages which it really possesses, its antagonists in more than one instance have advanced the cause of those who endeavored to render this practice popular. Avicenna speaks of surgeons who laid bare the hernia, raised up its internal envelope without opening it, and cauterized the ring to a great depth with a

red hot iron. Others, like Franco for example, laid open the sac, and confined themselves to touching its neck with a button cautery. A number of chemical caustics were employed for the same purpose. The oil mentioned by G. Fabricius, the sulphuric acid of the charlatan Littleton, and which another charlatan succeeded in rendering popular at Paris in the time of Arnaud, the muriate of antimony, potash, the essence of euphorbium and ranunculus, &c., have been successively made use of.

It was by the oil of vitriol that Maget, sustained by Gauthier, and who was soon after exposed by Bordenave in the Academy, obtained in 1773 the pretended cures which induced him to request the patronage of the government, and with which he caused the death of La Condamine. The potential cautery was applied upon the skin in the form of a line or on a circumscribed point near the neck of the hernia, with the view of producing an eschar there, and of causing the sac to suppurate after it had perforated it. It appears however that Monro and the naval surgeon mentioned by Sabatier, applied their escharotic to the interior of the sac also. Considered in this point of view, cauterization embraces two methods which are quite distinct, one in which it is applied only to the hernial coats, the other, on the contrary, which attacks the orifice through which the organs have been protruded. The first is attended with the inconvenience of incurring the risk of not penetrating sufficiently deep, or if we do so, of injuring some important organ; the inflammation which it occasions may not be limited to the sac, but extend to the peritoneum, and in this manner cause the death of the patient. The second also, which does not entirely protect us from this danger, possesses at least the advantage of enabling us to avoid with greater certainty the viscera, since the operator commences by laying these bare and pushing them back into the abdomen. It must be added that this alone presents any chances of success.

B. *Ligature.*—The mode of applying a ligature around hernias, which we are desirous of curing radically, is far from having been always the same among all authors. Some apply it immediately upon the sac, and others on the skin, without any previous incision. Paré mentions those who confined themselves to a circular incision, upon the bottom of which they applied the ligature. At the time of Paul, many practitioners also had recourse to this furrow; but many of these afterwards opened into the sac, in order to satisfy themselves that no organ was included in the ligature. Guy de Chauliac says that we must first lay bare the sac, in order to seize it and to strangulate it with greater certainty at its root. Among those who made use of an indirect ligature, there are some who, like Thevenin, perforate the entire pouch with a double thread, and afterwards strangulate its two halves separately. J. L. Petit, who has slightly modified this process, professes to have derived great advantages from it. Celsus speaks of other practitioners who placed the integuments between two pieces of wood and compressed them in the same manner as with a veterinary pincers, until they had become gangrened. Finally, the most ancient process, and the one which was adopted by Saviard and Desault, consists in circularly constricting the neck of all the hernial envelopes, in such manner as to effect its mortification.

in a greater or less length of time. This method, which is less barbarous and less formidable than cauterization, has certainly effected a number of cures. If Lassus had understood better the nature of the process, he would not have called in question those cures which Bichat enumerates in the practice of Desault. Every thing also goes to prove that the medical societies of Lyon and Paris would not have so unequivocally proscribed it in 1812, when M. Martin addressed his memoir to them in order to revive this practice, if they had directed their attention to the nature of the inodular tissue, which is formed by the ulceration caused by the thread. Inasmuch however as it cannot but be painful, and incur the risk of peritonitis, or include even some portions of the viscera, unless it has been cautiously performed : and as on the other hand umbilical hernia in children, to which it is especially applicable, frequently disappears without any application or under that of a simple bandage, this operation scarcely deserves to be rescued from the oblivion into which it has fallen, and the successful result obtained by this means by M. Bal, does not enhance its value any more than those which are said to have been obtained by it in experiments upon chickens.

C. *Suture.*—The suture, in applying which they confined themselves to sewing up the sac, which had been previously incised or merely emptied, is in the first place infinitely more dangerous than the ligature in the manner it was applied by Desault, inasmuch as it sometimes requires a very tedious dissection before we can accomplish it ; in the second place, not necessarily leading to the formation of an elastic cicatrix, since it is not attended with loss of substance, and has no other object in view than to obliterate the sac, it is clear that it must be less efficacious in preventing the return of the disease than the first process. Moreover it is not susceptible of general application, as it is calculated especially for inguinal hernia in man, as well as for castration. Consequently it is unnecessary for me to speak of it in this place.

D. *Incision.*—Incision has been long regarded as an excellent remedy for the radical cure of ruptures. It was not scarcely until some time in the last century that it was abandoned by surgeons. All the tunics and the sac itself were successively divided according to the same rules as for strangulated hernia. The viscera having been reduced, they proceeded to the dressing, and the wound was cicatrized in the same way as in the last case. The obliteration of the sac was to be a necessary result of a process like this, and the operator hoped thereby to protect the patient from any return of a protrusion of the intestines from the abdomen. It was soon perceived by practitioners that the question had not been examined in a correct point of view. J. L. Petit, listening to the counsels of Arnaud, and contending against his own convictions, deeply regretted having had recourse to this operation. One of his patients died on the fifth day ; he was witness also to a similar fatal result, and it was not until after having incurred the most serious dangers, that a third patient operated on was restored to health. Acrel, Sharp, Richter, Abernethy, &c., in pointing out the same disastrous results, have also shown that incision in hernia is in itself much more formidable than Lieutaud and Le Blanc seemed to consider it.

*E. Excision.*—If incision has had to be abandoned in practice, excision has been proscribed for much stronger reasons. We could not in fact dissect, isolate, and remove the sac, after having laid it open, as is recommended by Bertrandi, without augmenting to a still greater degree the difficulties attending herniotomy. By confining ourselves to excising opposite the ring, a disc including the entire thickness of the envelopes of the tumor which has been previously reduced, as is recommended by Lanfranc, we might also give rise to peritonitis, and moreover wound the viscera, should they be ever so slightly adherent to the interior of the sac. Excision of the whole hernial pouch would, it is evident, expose to still greater risks. It is truly painful to read the details of operations of this description, in the works of Arnaud, Schmucker, and some other surgeons of a more modern date.

*F. Scarifications.*—In place of excising the sac after having laid it freely open, Le Blanc proposed to effect the radical cure of hernia by the dilatation of the ring, which had already been extolled by the ancients, but especially by Arnaud, to overcome the strangulation. The idea of scarifying the ring, which is attributed to Leonidas, and which is distinctly mentioned by Verduc, Freytag, &c., is less extravagant, and Richter perhaps was not conscious of the full value of his remark, when he observed that those small incisions in such cases, greatly assist the adhesions which must follow the operation. The effusion of lymph which almost necessarily results from them, favors in fact the prospect of all the tissues becoming blended together at the opening of the sac, and of closing up the ring effectually. If J. L. Petit and the surgeons mentioned by Heister, had been acquainted with this fact, they doubtless would not have maintained that scarifications are better calculated to relax than to consolidate the hernial canal or opening. It is evidently to a want of this knowledge that we must impute the contempt of Lassus for this process, and the silence which most modern authors have shown in regard to it. The principal objection which may be brought against it, is that of exposing to the same dangers as incision, of which after all it is nothing more than a simple modification.

*G. Organic Plugs.*—The radical cure of hernia has always been so ardently desired by patients, that the necessity of devising some remedy has never ceased to be an object of extreme solicitude in the minds of surgeons, and that in our time many additional means have been suggested for the same purpose.

*I. A plug of the epiploon.*—When after the operation of strangulated hernia, we are satisfied that the case is one of entero-epiplocele, we may, after having reduced the intestine by inserting the epiploon into the rings, compel it to contract at that place adhesions which will afterwards resist the reproduction of the rupture. M. Cooper has occasionally succeeded in this way, and I am informed by M. A. H. Stevens of New York, that he has been no less fortunate. I have procured the same result in three patients, and M. Goyrand has also related some instances of the same kind. However, besides that this process does not always succeed, it possesses also a double inconvenience: the epiploon, stretched like a net or in the form of a bridle from the umbilical region to the inguinal canal, predisposes to colics

and tractions upon the stomach, and moreover to actual internal strangulations; while, in the second place, it scarcely appears to be applicable except to cases of strangulated hernia. I will nevertheless add, that after the operation for every strangulated entero-epiploic hernia, the epiploon, whether we wish it or not, becomes attached behind or to the interior part of the canal, in such manner as to form the bridle which I have spoken of above. It is a process of plugging therefore which is in some respects natural, and which it is as well to aid under the circumstances just mentioned.

II. *Plugging with the testicle or the sac.*—Moinichen and Scultetus speak of a process which consisted of plugging up the ring by crowding the *testicle* into it; but it is useless to speak of a suggestion of this kind. J. L. Petit, or Garengeot rather, who dissected up the sac, formed it into a peloton, and then pushed it back into the canal in the manner of a plug, as is still recommended by M. Steffen, (Frocriep, *Notizen, &c.*, b. 41, no. 3,) must have accomplished the same result with less danger.

III. *A plug of dissected integuments.*—A lady operated upon successfully for strangulated hernia, being much grieved to find her malady return at the expiration of a few months, desired to be relieved of it at every hazard. It was a crural hernia. M. Jameson, after having laid bare the ring, cut out at the expense of the neighboring integuments a lancet-shaped flap two inches long, ten lines in breadth, and having its root towards the first wound, then carefully dissected it in order to reverse it and to introduce its floating portion into the hernial opening, fixed it in this position by reuniting the solution of continuity which he had just made, by means of some points of suture, and supported the whole by the aid of an appropriate bandage. The patient recovered perfectly, and there is every reason to believe that the *plug* lodged in the crural canal became engrafted upon it. At first sight we see nothing but what is ingenious in this method, while all its details are plainly understood. If, on the one hand, it is more complicated and painful, and as dangerous at least as incisions and scarifications, on the other it appears to be of a nature calculated to procure much more certain results, inasmuch as we are sure by this means of closing up the passage for the viscera. Nevertheless to appreciate its value with a full knowledge of the circumstances, we require facts, but science at present possesses only one. I will also remark that this fact does not possess all the authenticity desirable, and that it is difficult to comprehend how M. Jameson, out of respect to the wishes of his patient, should have consented to have only the femme de chambre as an assistant and witness in an operation of this description. So much mystery, in fact, is naturally calculated to create doubts in the mind of a person of the least suspicion.

IV. *Plug with the invaginated skin.*—The invagination of the integuments in the manner performed by M. Gerdy, or by the modification of M. Leroy, or that of M. Signorini, (*Gaz. Méd.*, 1827, p. 236,) would appear at first sight to possess a greater degree of efficacy. I have performed it in one instance with success. M. Gerdy appears to have operated in this manner upon about thirty patients; but though many of them appear to have been cured, it

would be prudent, I think, to wait before adopting this method exclusively. In fact the plug which is fixed in this manner in the inguinal canal, cannot contract any adhesions but such as are very feeble, and everything unfortunately induces us to believe that either a little sooner or a little later the viscera will again crowd it to the outside and reappear at the ring under the form of hernia. Certain it is, that a young man and two other patients, who were at first supposed to have been cured, and whom I have since seen, are at the present day precisely in the same condition that they were before the operation. I will add, that without being absolutely dangerous or exposing to any serious risk, as has been supposed, of wounding the epigastric artery, it may nevertheless bring on a phlegmonous inflammation of a grave character in the iliac region, and even a fatal peritonitis.

H. *Method of M. Belmas.*—In 1829 M. Belmas projected a method which appeared to him to be at the same time more easy and certain and less dangerous than all the others.

1. *First Process.*—He recommends that we should introduce and attach a small *pouch of goldbeater's skin* to the upper part of the hernial sac. The plastic matter soon spreads and penetrates into the texture of this foreign substance, and to some extent combines with it. The whole becomes organized, contracts adhesions with the ring or neck of the sac, is transformed by degrees into a solid nucleus, and ultimately establishes an almost insurmountable barrier against the protrusion of the viscera. Numerous experiments upon dogs corroborated the assertions of M. Belmas. It remained to apply the process upon man, which was done for the first time upon the Sieur Plessys, 54 years of age, who had been afflicted with a very large sized inguinal entero-epiplocele for the space of about 34 years. The operation was attended with perfect success. The author communicated his process to Dupuytren, urging him to make trial of it upon a boy aged 14 years, who was then at the Hotel Dieu, for a congenital hernia complicated with hydrocele. Various circumstances rendered the operation long and embarrassing. Alarming symptoms were produced by it and caused much uneasiness during the space of about ten days. The patient nevertheless was gradually restored, and about the termination of the second month the hernia as well as the hydrocele were found to have been radically cured. A third trial made by M. Belmas, assisted by M. Jaquemin, at the Madelonettes, on a girl of the town affected with syphilis and umbilical hernia, was not sufficiently complete to enable us to deduce from it any positive conclusions. A solid and permanent cure, nevertheless, was effected by this attempt, in other respects so imperfect. In a fourth patient, 57 years of age, with hydro-sarcocele, M. Belmas was desirous of ascertaining if his method would succeed, at least in closing up the ring and curing the hydrocele. The goldbeater's skin had become consolidated at the upper part of the tunica vaginalis, which had become inflamed and had to be emptied of the seropurulent matter with which it had become filled by the inflammation. Finally, a fifth trial was made by myself, assisted by M. Belmas, at La Pitié, in the month of November, 1830, upon a man about 60 years of age, having two inguinal hernias for a long period of years, and who, at his entrance into the hospital, had exhibited some symp-

toms of strangulation, and who died in consequence of a gangrenous erysipelas. The first of these cases is calculated to confirm all the anticipations of M. Belmas; the fourth, that of the hydro-sarcocele, possesses, in my opinion, very little value in regard to the principal question, and scarcely deserves to be noticed. That of the public girl proves nothing in itself either for or against the method. The child operated upon by Dupuytren appears to have been seized with an inflammation of the gastro-intestinal passages, and not with peritonitis. In my own case symptoms of an abnormal character were developed, and death was actually produced only by the remote cause of a gangrenous inflammation of the scrotum.

*Second Process.*—M. Belmas, carrying out his first idea, considers that he has at last arrived at a process which will be completely successful. His new method consists in depositing in the sac, as near to the ring as possible, small *strips of gelatine* or goldbeater's skin. For this purpose he perforates the whole thickness of the scrotum with a kind of needle canula. When the dilated portion of this instrument appears to have arrived into the hernial cavity, it is unscrewed in order to separate its two halves in the sac, into which latter the canula then enables us to introduce small strips of animal matter. Adhesive inflammation supervenes, the walls of the sac agglutinate, and the obliteration of the pouch must be the result. Though M. Belmas has informed me that he has already succeeded by this process, I am nevertheless disposed to believe that in most cases it will allow the hernia to be reproduced, and that it possesses still less certainty than that of M. Gerdy.

I. A distinguished surgeon of Lyon, *M. Bonnet*, has introduced into practice a more simple method, or one at least of more easy application. It consists in perforating near the ring the whole thickness of the scrotum, comprising the sac also, with *several pins*, while taking care to avoid the testicular cord. These pins, curved back or shortened at their free extremity by means of small pieces of cork, are intended to bring the walls of the sac in contact and to effect their adhesion. Four patients are stated to have been already cured in this manner, and M. Mayor of Lausanne, who makes use of a small seton in place of a pin, considers it an invaluable method, and one that is almost always infallible. As far as I can judge *a priori*, this process, which is nothing in reality but a modification of the ligature which was formerly extolled so much, or of the simple incision, will not continue in practice. Not because it exposes to much risk, as some persons appear to apprehend, of wounding the spermatic cord, but because it can only effect an imperfect agglutination of the sac and leaves the whole length of the inguinal canal open.

J. M. Malgaigne, with a view to avoid the cord with certainty, and to produce a more extended obliteration, recommends that we should perforate the track of the canal with several needles, and proceed to compression by means of a suitable bandage as soon as the neck of the sac is slightly inflamed.

K. *Method of the Author.*—Sensible, like other practitioners, of the want of a radical cure for inguinal hernia, and convinced moreover for a long time, as I have elsewhere said, that we were wrong in abandoning indiscriminately all the trials which had this object in

view, I also have endeavored to arrive at it by a special method. The process which I have proposed is the same as that which is employed for the radical cure of hydrocele. I made up my mind to it after having acquired the proof that irritating injections in the tunica vaginalis are infinitely less dangerous when they reach the peritoneal cavity than is generally supposed. The injections formerly made trial of, and still used in our day for the radical cure of ascites, had already emboldened me. The fact of wine having penetrated into the belly through a congenital hydrocele, without any serious accident resulting therefrom, had afterwards satisfied me that the treatment of hydrocele in children could not be attended with much greater danger than hydrocele in adults. Passing from these premises to actual practice, I did not hesitate to inject irritating liquids into congenital hydrocele ; and I soon obtained the conviction that by means of the precaution of compressing the inguinal canal during the operation (see *Hydrocele*) there was no danger in adopting the process ; from that point to the idea of the radical cure of inguinal hernia the distance was very trifling. I had also remarked that a hernia coexisting with a congenital hydrocele had not been reproduced after an operation had been performed for the latter. I then conceived the idea at the commencement of 1835 of attempting the radical cure of hernia by this process, especially after it had been demonstrated to me by numerous examples that the tincture of iodine possessed a decided superiority over wine when the object was to bring about adhesive inflammation of the serous membranes. I had already waited several months for an occasion to put this new method to the test, when I found myself in a position in which I was, so to speak, forced to make use of it in the month of February, 1837. At that period, in fact, I had at the same time at the hospital of La Charité two men who were seized with an acute hydrocele of the sac, a few days after returning into the belly the intestine contained in an entero-epiploic hernia. I punctured the cyst and extracted eight ounces of serum in one case, and six in the other. I injected in their place a solution of six gros of tincture of iodine in three ounces of water, and no accident supervened ; the sac was obliterated and the last time that I saw the patients, which was three months after the operation, no appearance had yet presented itself of a return of the disease. Considering myself justified by these trials to attempt the direct cure of reducible inguinal hernia, I submitted a patient to the iodine injection in the commencement of July, 1837. I made an incision about an inch long through the tunics of the scrotum down to the external surface of the sac. Having opened into this latter with the point of a bistoury, I introduced into it the canula of the trochar, guided upon a blunt-pointed probe. Afterwards securing the opening of the sac upon the canula by means of forceps, I directed an assistant to inject into it the abovementioned solution, while another assistant, compressing the inguinal canal, rendered it impossible for the tincture of iodine to penetrate into the peritoneal cavity. After having thrown the injection upon all the points of the sac, I allowed it to run out through the canula, after withdrawing which last also I was enabled to reunite the wound by means of three points of twisted suture. Up to the present time the

symptoms of reaction have been precisely the same as in hydrocele. Without venturing yet to express a decided opinion upon the value of this mode of treatment, I consider myself nevertheless justified in saying that, *a priori*, it presents, to say the least, as many chances of success as any of those which have been extolled up to the present moment. As it is in reality nothing more than an experiment, I shall avoid at the present time entering into a further discussion concerning its importance; if I have alluded to it in this article, it has been rather with the view of fixing its date than to show precisely what is my opinion regarding it, or what are the advantages that might be derived from it.

### § V.—Appreciation.

After having confided for a long time upon the efficacy of the thousand remedies successively enjoying a reputation for the radical cure of hernia, it has been finally concluded that this result is next to impossible. The openings through which the viscera escape being surrounded by bones or fibrous cords, have not it is asserted any natural tendency in themselves to close up, and the judgment cannot perceive at first how the operations proposed could effect their obliteration. All the world, it is added, acknowledge that the operation for strangulated hernia does not exempt the patient from the necessity of wearing a bandage. It remains to know if under this double point of view, we have not allowed ourselves to be imposed upon by certain prejudices. Though it be true that herniotomy does not always secure the patient from a return of the disease, it cannot be denied however that this sometimes happens and even quite frequently. I could furnish many examples of this fact; one among others of a young student of medicine whom I operated on in 1827; a second, still more remarkable, and which relates to a man about thirty years of age afflicted with a congenital hernia, and whom I operated upon in 1824, at the Hospital of Perfectionnement; a third, that of an adult who had had an entero-epiplocele for several years, and whom M. Payen operated upon in my presence about the beginning of the year 1831; finally, four or five others whom I have since operated upon. The operation for hernia almost of necessity produces a wound which will suppurate, and the whole surface of which will become covered with cellular granulations as high up as into the ring. By this means a new tissue is formed which is the base of the cicatrix, and which by its great elasticity and the adhesions it contracts with the surrounding tissues, is certainly calculated to close up, by a firm consolidation, the track of the hernia. To comprehend correctly the character of cicatrices under these circumstances, we have only to reflect upon the displacements caused by those which are usually produced by burns of some depth, small pox, &c.

For this result to be produced, however, it is necessary that the wound should have suppurated, and that the whole surface of the sac, and even the interior of its neck, should have had time to become transformed into cellulo-vascular granulations. If art therefore possesses the power of effecting a radical cure of certain hernias, the

mode by which we are to accomplish this object is to plug up their passage, by causing there the production of an inodular cicatrix. Cauterization is evidently calculated to procure this result, when, for example, it is applied to the entire thickness of the scrotal tunics, and is made to reach up as high as the internal surface of the neck of the sac. The indirect or direct ligature is less certain, because it acts only from without inwards, and because under this mode of treatment the interior of the ring may not take on any morbid process. The loss of substance produced by excision is a guarantee of success which cannot lead to an error. The simple incision itself would also doubtless frequently succeed, if we decided upon closing the wound only by second intention. Scarifications ought still to have the preference over all these processes; in the first place, because they do not incur the risk of wounding the spermatic cord, as is the case in cauterization, nor the vessels, as in excision; and secondly, because they produce as their result a cicatrix much more solid than incision properly so called, and which they effect moreover with scarcely any more difficulty or embarrassment. As to the method of M. Jameson, should new facts be obtained in confirmation of what its inventor says of it, I should deem it preferable to many of the others. The tegumentary plug which is inserted into the ring, would replace remarkably well an inodular mass of the firmest consistence, while allowing at the same time of the immediate reunion of the wound. The process of M. Gerdy, M. Leroy and M. Belmas would also probably act in the same manner. After the operation for strangulated hernia, the crowding back of the sac, a plug of the epiploon, or scarifications, are in my opinion formally indicated, and would, I am certain, result in obtaining radical cures, if at a later period we combined with it compression properly applied upon the whole track of the canal or ring. Except for strangulation, the processes of MM. Gerdy, Bonnet, Mayor, &c., ought on account of their being more innocuous, to be preferred to the ancient methods. Unfortunately they can scarcely be attended with success except in rare instances, if they are applied exclusively and simply alone. With me the object would be to irritate and gently inflame the sac as far up as to the iliac fossa, and then to keep its walls in contact for the space of several weeks. The method I would adopt would be according as the circumstances existed, the processes of Belmas, Gerdy, Bonnet, Leroy, Malgaigne or my own; the irritation having been produced and the pain subdued, I would establish upon the whole track of the canal, or upon the hernial openings, a methodical compression with the bandages of M. Fournier.

This compression being persevered in and watched during the space of a month or two, and which would not prevent the patients from getting up and attending to some of their occupations, would succeed in at least eight instances out of ten, if the future should not belie what I have already seen of it. At the present time, this cure, as a possible result, cannot as I conceive be hereafter called in question. The question only arises to ascertain at what risk it is to be obtained. In itself the operation is in reality neither difficult nor very delicate. The lesion of the testicle, cord and vessels, and the different local accidents which it may endanger, are not inevitable.

The general symptoms and the peritonitis which have been caused by it in more than one instance, constitute therefore its principal dangers; but the few facts related by J. L. Petit, Richter, Abernethy, &c., should they be deemed sufficient to put this question forever at rest? The removal of a loup, and the operation for congenital hydrocele have also caused death; no one therefore would conclude that we ought to proscribe these operations, though they are used in maladies of a less serious character than hernia. Upon the supposition that we decide upon employing it, we must not however imagine that the radical cure of hernia is applicable to all cases indiscriminately. It is at the period of youth that it presents the least dangers and the most chances of success. The two extremes of life are the least favorable to it, because of the intractableness of children, and the rigidity of the tissues in old persons. It should generally be proscribed in old hernias, and such as are of a large size, irreducible and complicated with extensive adhesions. We might nevertheless have recourse to it with advantage, should the enterocele or epiplocele only be restrained at the bottom of the sac by a bridle, which could readily be divided by a cutting instrument. It is clearly indicated for example, when in a congenital hernia certain filamentous adhesions expose the testicle to painful tractions, and to be drawn up to the ring whenever the viscera re-enter the belly, or when we endeavor to reduce them. The dangers that Zimmerman encountered after a similar operation, were probably owing to the difficulties experienced by the surgeon, much more than to the operation properly so called, and are no argument against it. Finally, herniotomy never would succeed better than in adults or young persons, in whom the enteroceles were devoid of adhesions, and not voluminous, or of very ancient date. As soon as the operation is decided upon, the patient is to be treated and placed in the same way as for strangulation, whatever in other respects may be the method that we have adopted. In conclusion, the radical cure of hernia would be too important a triumph for surgery, and a resource too deeply interesting to humanity, to permit that we should not endeavor to improve it still more, and to modify its processes, and to make renewed efforts for the purpose of attaining this result. For myself, I cannot cease to entertain the idea, that in the experimental spirit of our age, we may succeed in obtaining a remedy of this description which shall be of real efficacy. I must however add, that it would be imprudent to pronounce judgment at this time, and that we should suspend a definitive verdict, until new facts shall have decisively established the relative value of the best methods.

#### § IV.—*Radical Cure of Inguinal Hernia.*

Besides the preceding methods, which are applicable to this as to every species of hernia, inguinal hernia has given rise to the suggestion of a number of others, which can only be described under each head; such particularly are castration, the gilded point, (*le point d'oré*), and the royal suture.

A. *Castration.*—Some of the advocates of excision and of ligature, or the crowding up of the sac, finding the dissection of the peritoneal

prolongation too tedious, endeavored to get over this difficulty by comprising the spermatic cord and the sac in the same thread. From this originated the idea of castration. To effect this Paul recommends that we should make a T incision upon the anterior surface of the scrotum. The transverse wound serves for the location of the ligature, and the other for the extirpation of the testicle. There are others who, after having laid bare the testicle at its lower portion, dissected the cord and the sac from below upwards, placed a ligature around the whole near the ring, and then made their excision below the thread. In the last century there were persons who strangulated separately the cord and the sac before excising them. Some went so far as to comprise the cord, sac, and scrotum in the same ligature. This operation, which was practised with a kind of furor by the ancients, is at the present day interdicted by law. Constantine, in order to suppress this practice in his dominions, was obliged to decree the punishment of death against those who dared to have recourse to it. Dionis speaks of a charlatan who fed his dog upon testicles which had been taken out in this way. Housse, in 1710, was sent to the galleys for the same crime. Castration was employed not only to cure but also to prevent hernia. Thousands of children have been mutilated for this purpose. Even women had the temerity to meddle with it. M. A. Prosse, in 1735, was subjected to the punishment of flogging at Rheims for such crimes. After this epoch there was, in the same diocese, a miserable woman who boasted of having operated in this manner on more than five hundred persons. Some of our provinces have been the scene of such scandalous practices, only a few years since. Doubtless it would be a difficult thing to explain how it happens that, even in our time, certain beings exist who can make up their minds to set at defiance morality and the laws, by performing this operation. I am not so certain, however, if the fault is not as much imputable to surgeons as to the public itself. In order to proscribe it, medical men have represented castration, in such cases, as exceedingly dangerous, and frequently liable to cause death. According to them, on the other hand, it could never effect a radical cure, and must always be useless ; but in these assertions there is an extreme exaggeration which goes beyond the object intended. An attentive perusal of the ancients proves that the vast majority of the patients who underwent castration recovered perfectly, and that numbers of them have been, by this means, cured of their hernia. It is unnecessary and barbarous, but it must not be pronounced without efficacy. The only cases which admit of its application are those of a saccocoele or incurable degenerescence of the testicle, coincident with a bubonocele. Whatever Sharp may say of it, I do not consider that adhesions, whether epiploic or intestinal, can require it, when in any process of kelotomy whatever, they are found to oppose the reduction of the displaced viscera. At the moment of terminating the operation for strangulated hernia, it is not sufficient that the testicle should present a little more or less volume than usual, and that it should *appear* to be slightly diseased ; it is also necessary that it should have undergone a profound alteration before any surgeon, worthy of this name, should decide upon removing it ; and it is with extreme surprise that I have met, in the

latest work of one of our distinguished masters, two instances of a course of conduct entirely the reverse.

B. *The gilded point.*—The gilded point is a process which goes back as far as to the time of Oribases, and which was invented for the purpose of avoiding the loss of the testicle, but of procuring, however, the same results as castration. It consists in passing a golden wire around the cord and sac, and afterwards in making compression in such manner that this last only shall be strangulated, and finally to reunite the wound without paying any attention to the presence of the foreign body, which the patient was to wear during the remainder of his life. This method, which was used in Denmark by Buchwall, and by Berrault in France, was not employed altogether in the same way by Paré, who recommends a leaden wire in place of that of gold, and that it should be withdrawn after the expiration of a certain time. The absurdity of so ridiculous a practice is sufficiently manifest in itself to dispense with the necessity of dwelling upon it. Any person can immediately perceive that a ligature adjusted in this manner cannot avoid the cord any more than the sac, and that it would more frequently result in atrophy of the testicle than in the cure of the bubonocele.

C. *Royal suture.*—The suture which was denominated *royal*, because, according to J. Fabricius, its object was to preserve the lives of valuable subjects for the service of their kings, is far from merit-ing the same reproaches as the point doré. In order to perform this process, the ancients first dissected the sac, then isolated it from the surrounding tissues, and afterwards sewed it up in its whole length without interfering with the cord. But Sharp proposed to improve this method, by suturing at the same time and near the ring, both the sac and the integuments. Whether by one mode or the other, we perceive that we are not under the necessity of sacrificing the testicle, and that it must present a better prospect of success than the gilded point. As it is nothing, however, in fact, but the suture applied to scrotal hernia, and that scarifications under such circum-stances possess the same advantage as in every other region, I do not deem it necessary that I should dwell longer on the importance of the royal suture. All the new methods which I have spoken of above, are evidently preferable, and as they are applicable especially to inguinal hernia, it does not seem to me necessary, to discuss at the present day, the relative value of castration, the point doré, and the royal suture.

### ARTICLE III.—STRANGULATED HERNIA.

Hernia is sometimes complicated with accidents, which make it one of the most dangerous diseases, and the only cure for which lies in surgical resources. The obstruction and strangulation, which are the most formidable of these accidents, deserve on that account therefore all the attention of the surgeon.

#### § I.

A hernia is said to be *obstructed*, (*engouée*), when the matters which should escape by the anus, accumulate and are intercepted in

the noose of the intestine, which forms the rupture. *Strangulation*, on the contrary, is produced by the mechanical constriction which the surrounding tissues exercise, from without inwards, upon a portion of the alimentary canal, in such manner as to obliterate to a greater or less degree its calibre. It is perceived by this definition that we may in fact have an obstruction without strangulation, and vice versa. Nevertheless, as obstruction rarely becomes dangerous, except from the strangulation which soon succeeds to it, I see no inconvenience in following the course adopted by many authors, who consider these two accidents only in the light of cause and effect, or of one following the other, and confine themselves only to the consideration of strangulation. *Strangulation* sometimes comes on slowly, at other times suddenly, exists to a greater or less degree, and is or is not complicated with inflammation, but it is nevertheless always strangulation.

The term of *incarceration*, which Scarpa employs for those cases in which the intestine is only distended in the hernia, and without having undergone any serious lesion, does not appear to me to possess any advantage. The words, moreover, are of little importance, provided we can convey a correct idea of the thing. A fibrous opening in the walls of the abdomen may yield and be temporarily dilated from some effort made, and allow a portion of the viscera to escape, and it may from its elasticity or muscular action then close up, so as to exert a violent constriction upon the organ which has passed through it. In such cases we have strangulation by *reaction of the hernial passages*. In other cases the contained parts swell and become more or less suddenly distended, and by this protruding movement, soon also produce a strangulation, which under these circumstances is caused by *reaction* of the *incarcerated organs*. The first case generally happening suddenly, and in some instances simultaneously with the hernia, or from receiving the addition of another portion of viscera into the sac which contains it, and being rapidly followed by inflammation, has received the name of *acute* or *inflammatory* strangulation. The second, developing itself rarely, except by degrees, and in hernias which are not usually reducible, and giving rise to inflammation only after the expiration of a considerable lapse of time, is denominated *chronic* or that by *obstruction*. Inasmuch as the openings by which hernias are protruded are entirely of a fibrous character, it has been supposed that the spasmodic strangulation suggested by Richter and some others, was a thing impossible. Fages of Montpellier, who, according to M. Delmas, still continued to maintain this opinion, endeavored in order to justify it, to refer this alledged spasm to the large muscles of the belly; but this view of the subject has not procured it any more partisans, and I myself have contested it. New researches, and more exact anatomical notions at the present day, influence me in adopting other views. From the species of button-holes which the hernial openings in fact represent, being both contiguously and remotely continuous with the muscular fibres, it results that every kind of muscular contraction may augment the strangulation of the parts which have protruded there. (See on this subject my *Anatomie Chirurgical*, 3rd edit., 1837.)

## § II.—Seat of the Strangulation.

Though hernias are usually strangulated at their root, this accident nevertheless is observed also at their body.

A. In such cases, it is caused either by a *laceration of the sac*, which has allowed the organs to protrude into the surrounding tissues, an imperfect septum, or any retraction whatever, or the orifice of a lateral cell of this envelope, or by an abnormal arrangement of the displaced viscera, or by some bridles or morbid *tumors*. The *torsion of the intestinal noose upon itself*, for example, may occasion it. The same may occur from an *epiploic band*, which would pass in front of the intestine, to divide it as it were into two portions, before becoming attached to the bottom of the rupture; and also from an opening made by a *laceration* in this membrane at the *middle of the sac*, and through which a part of the intestine shall have protruded. The *epiploon*, rolled up in the form of a *cord*, may also become attached at first upon one side, and then upon the other, in such manner as to form a sort of bridge, and even to make another bridge by proceeding to attach itself again upon the first wall of the hernial cavity. Two of its prolongations sometimes may approximate, after having contracted lateral adhesions, and may unite a little lower down, leaving between them an opening, which is also liable to cause a strangulation. All kinds of bridles may also produce the same result as the epiploon. Hey gives the figure of one, which, attached at its extremities to the two sides of the sac, formed at its middle portion a complete circle, through which the intestine had protruded. In a patient, whose dead body I had an opportunity of examining, an indurated mass of epiploon of the size of a large pullet's egg was the cause of the strangulation; the same accident was produced in a patient operated upon by Pelletan, by an enormous tumor of the mesentery. The appendix of the cæcum would lead to the same result, if it should be found in the hernia, and should adhere by its point. The same remark is applicable to the thousand morbid alterations which are calculated to produce pressure upon the noose of the intestine and to interrupt the progress of matters through it. Even *inflammation of the sac* caused by external violence, may produce strangulation, as is proved by the case of the patient mentioned in the collection of the theses of Strasbourg, (1803,) and who had received a spent ball upon the scrotum.

B. At its root the hernia may be strangulated in the same manner, at first as in the preceding case, and afterwards by the opening through which it has necessarily protruded. But this opening, as we now know, comprises several organs, the constricted portion of the peritoneal prolongation, and the circle or fibrous canal which contains it.

I. At first sight it would appear difficult that the *neck of the sac* itself could produce strangulation; there is no point, however, better established. In ancient hernias the agglutination of its folds has already caused a great increase in its thickness. Cellular lamellæ, moreover, are successively accumulated upon the external surface of this neck. The plastic lymph which is deposited there at the same time unites the whole together, and gradually gives to this

part a very great degree of density, a thickness in fact which may become extreme, since Arnaud mentions that it was more than a half an inch through in one of his patients, and that M. Graefe has seen a similar case. A lardaceous, and even semi-cartilaginous appearance has also been seen here in certain cases; so that this thickening, arrested externally by the resistance of the ring, is effected at the expense of its own proper calibre by a concentric reaction, the whole of which is exerted upon the intestine. The strangulation in such cases is sometimes so independent of the opening of the abdominal walls, that this latter remains wholly free, and so large as to enable the neck of the sac to move in it with facility; so much so, that we might easily succeed in returning the neck into the belly, together with the viscera, without in any respect diminishing the constriction, unless we had previously divided the latter. Arnaud, Le Dran and others were the first to point out this arrangement, which Rivière, Schenck, Litre and Nuck had only imperfectly explained, and the knowledge of which Scarpa, after Pott, Willmer, Hey and Sandifort succeeded in diffusing. In France Dupuytren is among the number of those who pointed it out in the strongest manner. M. Lawrence, who at first denied its existence, himself admits it in the last editions of his work; while at the present time this species of strangulation is no longer called in question by any one. It presents even several varieties which are sufficiently distinct; it may be altogether annular, or very circumscribed for example, and be situated only at the entrance, exit, or middle portion of the neck, or it may occupy the whole of this prolongation, and transform it into a sort of case or sheath, which is more or less contracted.

II. The *aponeurotic opening*, which was almost the only part to which strangulation was formerly attributed, also produces it in fact, in a good number of cases. But since we have understood the difference which exists between the simple *ring* and the hernial *canal*, a distinction has become indispensable on this subject, in the same way as for the neck of the sac; that is to say, that in the openings which are in the form of a canal, the strangulation, far from existing always at the external orifice, as had been supposed, may also be situated at the internal orifice, or at an intermediate point, and sometimes even upon these different parts simultaneously.

III. *Signs of strangulation*.—The most difficult, and at the same time the most important point to ascertain in strangulation, is to distinguish it accurately from every other kind of disease, and not to confound it with any other lesion.

A. If the *tumor* is *small*, and has not attracted the attention of the patient, too superficial an examination might give rise to the belief that there existed a violent phlegmasia, a volvulus, a poisoning, &c. These kinds of mistakes are far from being uncommon, even though the hernia may not be very small. A surgeon in the environs of Paris was called to a patient, whom he supposed to be laboring under an attack of gastritis, and whom he treated accordingly. The accidents continued, when a second surgeon was called in, who recognized a strangulated hernia. A domestic of one of the public functionaries died of an alleged inflammation of the intestines: it

proved to be a strangulated hernia, which was not ascertained until after her death. A very strong and robust man was seized with violent colics and convulsive movements. It was supposed to be a case of gastritis; leeches were applied to the epigastrium, and a state of rest recommended for the space of three days, when the patient was brought to La Pitié. He had a bubonocele, which I was enabled to reduce immediately. A little more knowledge and precaution in such cases would readily prevent mistakes; but this is not always the case, and the most skillful surgeons sometimes err on this point. In 1817 a woman, who was the directress of the nurses of the Hospital of Tours, was attacked in the night with colic, vomitings, &c.; I questioned her, and found she had never had a rupture. M. Bretonneau examined her on the following day, and there was no trace of rupture found either at the abdomen or the groins. Nevertheless, the pain increased under pressure made at the fold of the thigh, and it was from this point that the colics appeared to derive their origin. A strangulation was suspected; but what could be done? We waited the event, and death occurred on the following night. A portion of the intestine of the size of a nut, had become strangulated in the left crural ring, and made no projection externally.

B. *Peritonitis*.—A number of circumstances may lead to the misapprehension of a constriction of the intestine in individuals affected by hernia, as for example, peritonitis when it is accompanied with constipation and vomiting. Pott, upon the recommendation of two consulting physicians and against his own opinion, decided upon operating on a young man in whom the hernia appeared to be strangulated. No lesion was found in the tumor; the patient died, but of an acute peritonitis. Pott, called to another case, was unwilling to operate. The death of the patient enabled him to ascertain that the hernia was not strangulated, and that the inflammation of the peritoneum had caused all the symptoms. M. Earle, in 1828, was no less unfortunate. The operation proved that he had been deceived by an enteritis, and that there was no strangulation. It is to be observed, however, that in these cases the disease is usually announced by a chill of greater or less violence, that the pains are much more acute in the belly than in the tumor, that the vomitings are glairy and greenish, and not stercoaceous, and that the face has a tendency to become shrivelled and not hippocratic.

C. *An inflamed sac*.—A no less difficult case is the following: the sac of an irreducible hernia, or the intestine which it encloses, may become inflamed and give rise to all the symptoms of acute strangulation. Hernias that are destitute of adhesions are liable to the same accident. Sometimes, however, the ring remains free and makes no pressure whatever on the organs which pass through it. To cause this inflammation, it is requisite that the pain should have commenced at the body or base, and not at the root of the tumor; that the skin itself should have been involved in this inflammation from the beginning, and the laxity of the hernial openings capable of being recognized by the aid of the finger. This result sometimes actually takes place, but when the hernia has but little volume, how can we avail ourselves of such circumstances? Fortunately in such cases, as

in actual strangulation, the operation is the best remedy to be employed. The viscera have been reduced and the tumor reappears. Symptoms of strangulation supervene; the operation is performed, and the surgeon finds nothing but a pouch filled with liquid, either purulent or flocculated, or serous or sanious. This pouch is the inflamed sac, the inflammation in which has closed up the orifice. Numerous examples of this kind have been related by Dupuytren and MM. Duparcque, Sanson and Janson. M. Key has also been deceived in this manner, and the error could not be dispelled but by the fact that it is almost always practicable to obtain some evacuations, and that the stercoral vomitings do not take place as in true hernia.

D. Certain *hydatoid tumors* are to be ranged in the same class, as is proved by a case published by M. Pigeotte de Troyes, and by those which have been mentioned by Desault, Dupuytren and M. Roux. A simple suppurating lymphatic tumor, a cold abscess or one of an ordinary character, also come under this description.

M. Baud in a case supposed he was operating for a strangulated hernia, but it proved to be nothing but a lymphatic tumor, upon the pedicle of which he applied a ligature. The symptoms became worse, and the patient died, when it was ascertained that the thread applied to the prolongation of the diseased gland, included at the same time a portion of the intestine. Purely fatty tumors expose to the same mistakes, and have occasioned them in more than one instance. Scarpa, under the impression that the case was one of strangulation, laid bare the supposed hernia, and met with nothing but a pediculated adipose mass, which he excised. The woman, after having passed through a number of serious symptoms, ultimately recovered. M. Cruveilhier relates a case in which the operator, less fortunate, lost his patient. A woman was seized with colics, vomitings, constipation, &c. She had an ancient tumor at the umbilicus. Being sent for to this case, I found all the symptoms of a hernial strangulation, threatening peritonitis. Before proceeding to the operation, I deemed it proper to prescribe a bath, leeches, cataplasms on the belly, and enemata of various kinds. They forgot to send her into my service from a medical ward, where she was at La Pitié, and death took place on the third day. An acute peritonitis was found, originating from an old lesion in the sexual organs, and the supposed hernia was nothing more than a pediculated fatty tumor. A peloton of epiploon may be transformed into an hydatid, or into a hard and immovable tumor, and may inflame and suppurate, and become a source of no less embarrassment, especially if there exists simultaneously a noose of the intestine in the hernia. A mower was suddenly attacked with colics and a desire to vomit, and at the same time noticed that a tumor as large as his fist had descended into the scrotum. He was admitted into La Pitié on the seventh day. The hernia was composed of two portions; one above which was soft, and but slightly sensitive, and which I succeeded in reducing; the other exceedingly hard, and of larger size, which I found it impossible to return. The symptoms, without being very alarming at first, continued for the space of three weeks, and had become aggravated to such degree, that the patient was at the point of death, when the suppuration of his tumor put an end to his sufferings, by restoring him to

health. A case nearly similar is found in the clinique of Pelletan. The epiploon may mislead also in another manner. A patient affected with abdominal hernia, died with symptoms of strangulation. The autopsy shewed that the epiploon, which was scarcely affected with any disease externally, was intensely inflamed in the interior of the belly, where it formed a sort of hollow cone, the base of which embraced a perforation of the stomach.

#### § IV.—*Indications of Strangulation.*

It must have been noticed by what precedes, that strangulated hernia is a dangerous disease, and that without the succor of art, it would be almost constantly fatal. As soon as it is recognized, it is important therefore to put an end to it, and to apply the proper remedy. To obtain its reduction, or to put a termination to the strangulation, are the objects that are to be had in view. To say with Richter and Callisen, that we should first subdue the inflammatory tendency, pain, &c., in order to diminish the constriction of the parts, would be to mistake the effect for the cause, and to attack the consequences in place of destroying the principle. To accomplish this purpose the operation is not the only remedy which the surgeon has at his command; this is only his last resource. Before proceeding to this point, the taxis, bleeding, baths, injections, anodynes, and various topical applications may and should be made trial of.

A. *Taxis.*—The first idea that occurs to us when called to a patient with strangulated hernia, is to endeavor to push it back into the abdomen, and this in fact is the first step that we generally commence with.

I. *To perform the taxis,* the patient is to be placed in a recumbent posture, and in such manner that his muscles may be readily brought into a state of relaxation, commencing as La Sourdière has shown, with the sterno-mastoid muscles. The surgeon, placed upon the right, embraces the tumor with one hand, draws it slightly towards him, as if for the purpose of disengaging it from the ring, seizes it at its neck with the two or three first fingers of the other hand, then pushes it back by small portions at a time, commencing with those that have protruded the last, and causing them to follow the axis of the hernial opening. In proportion as he returns one part of it, the fingers of his other hand secure it and prevent it from coming out, while the right hand is prepared to push up another part, and in this way in succession, until there no longer remains any thing more than quite a small mass, which is to be pushed up in its totality by means of pressure properly applied. When the reduction is effected without difficulty, this last portion, introduced by the extremities of the five fingers of the first hand, passes through the ring without being arrested there, accompanied immediately with a characteristic sound which is called *gurgling*, a bruit which is caused from the liquids which had been before imprisoned in the noose of the displaced intestine, being now suddenly left to resume their passage along the whole course of the alimentary canal.

II. *Epiplocele,* which is moreover distinguished by its irregular grumulous form, and its soft cakey consistence, does not produce any

*gurgling* sound, nor does it yield with as much facility as enterocele. The taxis, however, should be performed after the same rules in both cases, except that in the second the pressure may be carried much farther without inconvenience than in the first. When, after various efforts, a portion of the hernia is observed to disappear suddenly, accompanied with a bruit, while the rest remains fixed in the sac, we may then conclude that there has been an entero-epiplocele, and that it is the intestine which has resumed its position. It is important, however, not to forget that an enterocele which has become strangulated from obstruction, may readily cause us to mistake it for an epiplocele, and that its reduction is not always accompanied with a gurgling sound.

III. If the *tumor* is small, the fingers of the left hand are confined to supporting its contour, while those of the right hand make pressure upon it in every direction. Even in cases where it has acquired a certain volume we may still make the attempt to return it bodily, provided the strangulation has not yet been developed to a great degree, and that it has been caused by the intestine passing through a simple ring. We may also, when it is very large, embrace it with both hands and compress it over its whole surface at the same time, in the same way as we would for emptying a bladder filled with liquid. The gas and semi-fluid matters thus crowded back, sometimes return into the belly so completely that they put an end to the strangulation, or give a remarkable degree of facility for the subsequent reduction of the viscera. This is a process which has succeeded with me in a great number of instances.

IV. After having in vain made trial of one mode, we must have recourse to another, and the taxis after all is an operation, the performance of which is learned much better by the practice, anatomical knowledge, and intellectual resources of each person, than by details laid down in the best works. In conclusion, to place the walls of the belly in a state of relaxation ; to support the neck of the tumor with one hand, while we push back this last with the other, and in such way that it may not fold up on the borders of the ring in place of passing through it ; to disengage it a little and to elongate it, and so to speak, to *knead* it, in order to disperse the matters which it contains, over as great an extent of surface as possible ; to embrace it with both hands, or only with the ends of the fingers, according to its volume ; to cause it to be grasped even by the hands of an assistant, when it is exceedingly large, while the surgeon supports its root ; to make it pass up in an inverse direction by the route which it has taken, when it protruded ; and to suspend our efforts, and to return to them at a proper time, and to vary their direction and force without however going at any time so far as to render them dangerous : such are the only rules that the operator is under the necessity of calling to mind, when he is about to undertake the taxis.

V. *Prolonged taxis.*—I should add that in *large sized hernias*, especially in the epiploic or those that are *obstructed*, it is frequently advantageous to continue the taxis by means of a methodical *compression*, until the surgeon resumes it with his hand, when he has not completely succeeded at first. It is this species of prolonged taxis that M. Amussat and others have extolled in extravagant terms under

the title of compulsory taxis, since the period when I recommended it in 1832. In 1825 a man aged forty-seven years, and affected with an enormous entero-epiplocele, was admitted into the wards of the Hospital of Perfectionnement. Attempts at reduction, frequently repeated the evening of his admission and on the following morning, were attended with no success; but as there was no evidence of inflammation, and that the symptoms developed themselves slowly, it was considered safe to delay. On the second day a trial with the hand was again resorted to, and the intestine partially returned. To prevent its reprotrusion I embraced the whole of the tumor in a suspensory padded with compresses. I succeeded by this means in acting upon it with methodical and sufficiently powerful compression, which reduced it to one half during the night, so that the taxis afterwards completed the work without difficulty. The *smoothing iron, a piece of sheet lead, and a bladder filled with mercury*, applied as weights upon the hernia, and from which Wilmer, as well as some other English surgeons, state they have derived so much advantage, together with the large cupping glass of M. Koehler are in reality nothing more than compressing means, for which an appropriate bandage may be always advantageously substituted.

VI. *Compulsory Taxis.*—Though the taxis may frequently possess the advantage of rendering a dangerous and painful operation unnecessary, it is far in itself from being always devoid of danger. The viscera, whose circulation is performed with difficulty, being irritated by the constriction and already more or less inflamed, must necessarily have this inflammation increased to a still greater degree under the influence of such compressions. Every one knows that if we did not proceed with all precaution possible, it would be very easy to contuse them, to cause their mortification or lacerate them, and to expose the patient to the most dangerous consequences. It has also been long remarked that the operation had so much the fewer chances of success in proportion as the attempts at reduction had been oftener repeated. There are persons, says Petit, who boast of reducing all descriptions of hernia; they compress, destroy and inflame the intestine, and I have always had recourse with repugnance to the operation in patients who have been subjected to such trials. Pott recommends that we should not wait over two hours, and from the period when he adopted this prompt course, almost all his patients were cured. Before that he lost the half of them.

Desault holds nearly the same language. Comparative trials had at the Hotel Dieu, had demonstrated to him, as they had to Saviard, (*Nouv. Obs. Chir.*, p. 105,) that the proportion of cures after kelotomy was much greater in such persons as were operated upon without having been fatigued by the taxis, than in others. At the Hospital of Orleans, where the operation was performed at the beginning, Le Blanc rarely failed of success, while at Paris, where it was not decided upon until at a late period, most of the patients died. So that Richter was induced to proscribe the taxis. He avers that he has rarely seen a hernia that was really *strangulated* reduced by this means, and alleges that those which have yielded to it would have returned of themselves a few hours later. These fears, which

are somewhat exaggerated, have no foundation however, except in cases of enterocele and inflammatory strangulation. In the case pointed out by Arnaud, the trials must have been very injudiciously prolonged to have caused the suppuration of the epiploon, or the immediate gangrene of an enterocele strangulated by obstruction, &c.; but it may be very readily conceived, that in acute strangulation, the taxis might, if it had not succeeded, become dangerous and render the operation infinitely more formidable than if it had been practised with moderation. Nevertheless in abandoning it too soon, we expose ourselves to the danger of unnecessarily performing a more severe operation. In many instances, by renewing it twice, thrice, four, and even six times, a painful hernia, which had resisted up to that period, has been made to return into the belly. In other cases, not less numerous trials, though unattended with success, have not prevented herniotomy, though performed at the expiration of two or even three days, from being followed with complete success. Finally, it has been so frequently noticed that a strangulated hernia has been successfully reduced by one surgeon, after having been in vain manipulated by another, that it would be wrong not to hesitate when the question is presented of abandoning the taxis.

A porter living near me had an ancient hernia, which had become strangulated the same morning only, in consequence of an effort made and in spite of his bandage. Three times during the course of the day attempts made to reduce it had failed. I saw him in the evening at eight o'clock, and his suffering and agitation were extreme. The slightest touch caused him to shriek out. All the pains came from the tumor, which could not endure, it appeared, the slightest degree of pressure. I nevertheless did not venture to decide upon the operation until I had performed the taxis again. I failed in the first attempt, but a sudden and involuntary movement of the patient while I was making a last trial, finally caused the whole intestine to return. The accidents immediately ceased, and on the following day this man was enabled to resume his customary occupations.

In the month of March, 1825, M. Demay desired me to see with him a woman who had been suffering under a strangulated *merocele* for the last 36 hours. The tumor, which was of the size of a small egg, was hard and painful, and evidently formed by the intestine. After having submitted it to the taxis, it appeared to me to have been slightly diminished, and I was unwilling to operate. I went to see her on the following day and attempted the reduction, but with no greater success than on the evening before. But as I found it still further diminished I hesitated, and the operation was again deferred a second time. At my third visit, 24 hours afterwards, we were all disposed to wait no longer and to proceed immediately to the removal of the strangulation; but when I had no longer any hope of success the hernia disappeared under my fingers, and two days after the patient was in perfect health.

Although these facts tend to prove that in general we ought not to follow to the letter the advice of Pott or Richter, and to lay aside the taxis after the first trial, I would not be willing however that they should give too much hardihood to young practitioners. It is but too common in our day, too, to find what Petit could still ex-

claim, in his time : "how often have we seen patients perish on the same day even that the reduction has been made! In some the gut has been found gangrened, while in others it had been torn and the faecal matters dispersed in the belly." This accident happened in the month of April, 1831, in one of our great hospitals, the very same day even on which the surgeon had earnestly inveighed against the danger of a compulsory taxis. I am aware of the fact also, that this accident occurred a short time after in the same establishment. The intestine had been lacerated in both cases, and similar results have happened in the hospitals of London, and one especially in the service of M. Calloway. The case mentioned by Lassus is in no way surprising, since the young man took the singular idea in his head of making use of a stick, and to apply one end of it upon the tumor to make it return while the other was supported against a wall. Since that period I have collected a greater number of these facts. The pernicious practice having found new defenders in MM. Herpin (*Journ. Hebdom.*, 1835, t. III., p. 216) and Diez, and in a surgeon of Paris, who considered himself the author of it, and who has had the boldness to boast of it in a full sitting of the Academy, was speedily followed by numerous victims. A person in the city was seized with a strangulated bubonocele; the surgeon had recourse to the taxis, and prolonged it to an excessive degree. The hernia returned and the patient was supposed to be cured, but he died on the next day but one. The hernia from having been complete had been merely made incomplete, without the strangulation being removed. Another case was treated in the same manner during the space of three days; he was brought to the hospital, and upon opening the sac the intestine was found lacerated. Seven patients who were admitted to my department in the years 1836, 1837 and 1838, were brought in after 4, 6, 8 and 11 days of similar attempts, and with their intestines gangrened or ruptured. The idea of a forced taxis ought so much the more to be proscribed, as it is infinitely to the taste of a great number of practitioners. Fearful of alarming the patients, in proposing a dangerous operation, having little practice in the operation itself, and justifying themselves upon such recommendations, they make use of all sorts of manipulations and thus cause accidents which have multiplied in a frightful manner in Paris, since 1834. In this question moreover they have set out upon a false principle. The operation for strangulated hernia is rarely dangerous when it is well performed, unless there should be already existing a peritonitis or some dangerous lesions in the displaced organs. In other respects it is one of those operations which succeed the best and occasion the fewest accidents. It is to be added, that by performing it, there is a prospect, if we follow the rules which I have pointed out in speaking of the radical treatment of hernias, that we shall effect a permanent cure for the patient; moreover it is evident that hernias that are decidedly strangulated may be utterly irreducible at the beginning, and that a considerable number of them cannot sustain the taxis without the greatest danger. The taxis, for example, must necessarily be injurious in all cases where the obstacle to the progress of the matters is situated in the scrotum, and when the intestine has arrived to that degree of inflammation that it is upon the point of becoming

perforated or gangrenous. If the strangulation is at the neck of the sac or at the posterior ring, or if it is produced by certain bridles, the taxis pushes back the tumor between the two rings and into the tissues of the parietes of the abdomen between the peritoneum and the fascia transversalis; it causes the hernia to disappear externally, but the strangulation nevertheless continues and the patients perish without it being possible to afford them any efficient relief.

V. Therefore the question is not to reduce the hernia at any sacrifice, but to know only how to make use of the taxis in a proper manner. Those hernias that are small, recent and painful, support it with difficulty, because the opening which has given passage to them is usually narrow and very much contracted; and because on the other hand the intestine thus bridled becomes inflamed and altered, or passes into gangrene with the greatest rapidity. The same remark nearly applies to hernias which suddenly reappear and become strangulated, after having been for a long time kept up by a bandage. The taxis is so much the more dangerous, as the patient is younger and more robust and more excitable.

In chronic strangulation it would be imprudent to operate before having made repeated trials with the taxis and even with a certain degree of force. Most old hernias come in this class. The presence of a portion of epiploon, of any adipose tissue whatever, or of a portion of large intestine in the sac, diminishes its dangers, because these different organs are better enabled to sustain the pressure than the small intestine. Moreover it is not the time which has elapsed since the appearance of the first accidents, which is to be our guide in employing it, but the condition of the parts. In some patients the gangrene or ulceration come on almost as soon as the strangulation. M. Larrey says that he has seen this happen at the end of two hours; Richter at eight, and M. Lawrence at twelve; while in other cases, which are apparently similar, and which I have witnessed, these results had not yet shown themselves upon the fifth or sixth day. In 1824 I operated at the hospital of Perfectionnement upon a woman named Molière, who had been laboring under acute strangulation for the space of four days. The intestine though livid was not mortified, and the cure took place promptly. Some months after another woman was brought into the same establishment to be operated upon for a similar difficulty. The symptoms, which had only existed twenty-four hours, exhibited less intensity than in the first case, and the hernia was also crural. Nevertheless the noose of the intestine was perforated, and notwithstanding it was liberated, death took place in the course of the night. Upon opening the body it was found that the alimentary matters had passed into the belly, and that the gangrene had invaded a great portion of the digestive canal. So long as the skin has not yet become exceedingly sensitive nor positively inflamed, that pressure upon the tumor does not increase the pain to too great a degree, and that there are no evident signs of an actual peritonitis, there is no reason why we should refrain from the taxis, unless it has already been put to the test by experienced persons. In the contrary case it would be better to renounce it, unless no attempt has yet been made with it. We have then everything to fear even in supposing that we do succeed, that we may return into

the belly an intestine which is half mortified if not perforated, together with the dark colored putrid and more or less acrid matters which usually surround it in the sac. When the hernia, all other things being equal, is greatly inflamed, the operation is the most certain relief to be proposed for the patient. Being at this moment scarcely more dangerous than the taxis, it has the advantage over it of removing the difficulties immediately and of not aggravating the condition of the viscera contained in the tumor. At a later period the case will no longer be the same. The organs being then contused, greatly injured, lacerated and gangrenous, no longer authorize us to form the same expectations, and the operation would only accelerate the extension of the disease to the interior, and the fatal termination.

*VI. Position.*—Instead of placing the patient as above mentioned, some surgeons, and Winslow among others, in the last century were in the habit of placing him upon his knees, with the head low down and supported on his elbows, during the time while the taxis was being performed. Some credulous or bigoted persons were in the habit of urging the patients, who were thus prostrated, to occupy themselves with fervent prayers, pretending that if the hernia returned while they were in this posture, it would be the interposition of Divine Providence that they would have to thank for it. A much more ancient practice, and which was still used by Louis, Hey, M. Ribes, &c., consisted in seizing the patient affected with hernia in such manner as to hang him by his hamstrings upon the shoulders of an assistant, who shook him gently, while his head and his back rested on the bed, or that another person performed the taxis. It is probable that a process of this kind may not be of very great importance, but it does not appear to merit the oblivion into which it has fallen, nor the ridicule that has been cast upon it at the present day. M. Lawrence is evidently deceived when he makes the remark that the abdominal viscera are too exactly supported in every portion of them for the mere position of the patient to draw them either in one direction or another. We may be made at any time sensible of the contrary of this, by noticing in ourselves that the intestines always tend towards the most depending part of the belly, as for example, towards the hypogastrium in the vertical position, and either to the one or the other side according as we are lying upon the right or left flank. I can therefore conceive that by holding up a patient by his hamstrings, there may be some chance that the displaced organs will leave the hernia to be carried towards the diaphragm, which has become in this manner the lower wall of the abdomen. There would for the same reason be danger in doing this if the intestine or peritoneum were already inflamed, or if for any reason whatever there were grounds for apprehending danger in any kind of traction made in the direction of the abdomen or hernia.

Linacier of Chinon, with the view of regularizing this succession into a method, and in order to generalize it, contrived in 1819 a kind of vibratory bed or tumbril, provided with cushions, and upon which the patient was adjusted in such manner as to enable us to move him more or less violently by successively relaxing and elevating the upper part of the apparatus. This bed, however ingenious it may appear to be, has not been and ought not to be adopted. In the first

place, it has the disadvantage of not always being at command, and of not being indispensable; while in the second place, the patients are stretched out and extended upon it; whereas in suspending the patient by his hamstrings, we may keep him flexed and strongly incurvated on his anterior surface. If therefore we were disposed to make trial of succussion, this last mode of operating ought to be preferred as more simple and less dangerous, and as efficacious as any machines contrived. There is no necessity of remarking that the taxis should be renewed with care, during the time that the assistant or assistants are holding the patient raised up or suspended; that it would be advantageous also to draw upon the wall of the belly on the side opposite the hernia; and that the succussions that are made upon the pelvis are not absolutely necessary. M. Kramer, (*Kleiner's Report.*, June, 1835, p. 25,) who makes his patient stand up and supports his loins with one hand, while with the other he pushes back the hernia, would, in my opinion, very frequently fail. As to gliding in the thumb underneath the spermatic cord in order to dilate the ring, as is recommended by Thomson, this cannot be applicable but to inguinal hernias.

a. *Baths.*—However little resistance the hernia may make, the taxis ought not to be employed alone. The bath, under such circumstances, is an auxiliary which is scarcely ever omitted. It calms or diminishes the pain, spasms, and rigidity of the tissues, the fluxional movement, and even the inflammation itself, if that should already exist. The temperature we give to it is 28 or 30 of Reaumur, that is, we make it somewhat hot. The patient is to remain in it for the space of one or even two hours. Desault recommended, that a sheet stretched at its four corners, should make in the bathing-tub a sort of bed upon which the patient might be laid in a gently flexed position, and subjected to new trials at reduction. Some practitioners return to the taxis one or several times in the course of the day, that is to say, so long as the operation has not been decided upon. If however more powerful means have been already had recourse to, it would be useless to return to it, and to waste the time which is precious by fruitless essays. Although the hot bath is applicable to almost every description of strangulation, it is more especially adapted to that which is acute, inflammatory, and intestinal, and in young and robust subjects. As however, unlike the taxis, it has not the disadvantage when it fails of augmenting the dangers; and as in the supposition even that the operation should become indispensable, it cannot but favor the successful issue, I see no reason for omitting its employment except in cases where it is no longer allowable to delay.

b. *Bleeding.*—The unanimity which prevails among surgeons in relation to the utility of hot baths in cases of strangulated hernia, does not exist to so great a degree upon the subject of bleeding. Eulogized beyond measure in such cases by Dionis, by almost all the Academy of Surgery, by Pott more than by any other person, and recommended by the most distinguished authors of our epoch, it has nevertheless, so to speak, been proscribed by Wilmer, Alanson, and Sir A. Cooper. Hey acknowledges also that in most cases it is useless, and that it is important to make some restriction in its employment.

By producing, however, a general suspension, this resource is calculated to facilitate the return of the displaced organs, to diminish the resistance of the muscles, the engorgement of the tissues, the local congestion, and consequently the volume of the strangulated parts, and above all the inflammatory symptoms. Bleeding pushed as far as syncope frequently gives such activity to the peristaltic movements of the intestines, that under its influence they will of themselves completely return into the belly. It would also be advisable, when we wish to attain this object, to open largely into the vein, and to keep the patient in a vertical position while we are bleeding him. As for the rest, to understand properly the importance of bleeding, it becomes necessary to specify the cases which require it. Obstruction, epiplocele, and every kind of strangulation in old men would be rather aggravated than relieved by it. Nor would delicate patients and ancient hernias always support it without risk, unless it should have been positively indicated by very decided inflammatory symptoms. In robust and young persons, and in intestinal, acute, and recent strangulation, it is on the contrary of unquestionable utility, and should rarely be neglected, were it only for subduing or moderating the inflammatory action which has a tendency to invade the abdomen. We should be wrong, however, to accord to it in any case the exaggerated importance which Pott has given to it. It would be also unreasonable to count upon its efficacy after having repeated it two or three times, even in patients in whom it appears to be most indicated. It is an auxiliary remedy, which like the bath rarely suffices of itself, and is unworthy of so much reliance in fact, except because it serves at the same time as a precaution against accidents which might supervene.

*c. Purgatives.*—Le Grand, a surgeon of Arles, proposed, in the last century, the administration of Epsom salts, promulgating it as a kind of panacea for strangulated hernia; according to him, this sharp medicine titillates the intestine, and frequently induces it to return into the belly, where it disembarrasses it of the matters which may have accumulated in it. More violent purgatives, and emetics to nauseating doses, as ipecacuanha, for example, have also been recommended. Richter and Heberden, who made use of these, allege that they have obtained great advantages from them. In France these remedies have never enjoyed much reputation, and the medical opinions which have been current since 1815 have not been calculated to bring them into favor among us, though their irritating action may be infinitely less dangerous than many persons have imagined. I would cheerfully have recourse to them where there was only an epiplocele or adipose hernia, when in fact the progress of the matters has not been mechanically interrupted in the alimentary canal, and even in enterocele which has become strangulated only by obstruction and does not threaten inflammation. As they encourage the secretion or exhalation of a greater quantity of liquids, a more decided peristaltic movement in all the upper portion of the canal, which may in this manner re-establish the stools or the softening of the obstructed matters, we may readily conceive that under such circumstances they may have been attended with some success, and that here are still at the present day advocates of this practice, as an in-

stance of which we may particularize M. Gaussail, (*Journ. Hebd.*, t. IV., p. 93.) A woman, thirty-two years of age, had reached the fourth day of a strangulated crural hernia. Everything had been made trial of, baths, bleeding, the taxis, and all kinds of injections. The belly was distended and painful, which with the vomitings, constipation, condition of the pulse and aspect of the countenance, left no doubt upon the danger of the symptoms that this woman must succumb to if the operation was not performed without delay. The patient peremptorily refused to submit to it. Having nothing farther to hope for, I granted her anything she desired. At her urgent request, milk and a purgative were administered to her. She took two ounces of castor oil in the course of the day. The symptoms continued until five o'clock in the evening, but afterwards became more moderate, and at the time of my visit on the following morning, the pupils who had been watching her were with myself perfectly astonished to find her out of all danger. Her restoration was complete. I have since collected five similar cases, and I consider this remedy to be a resource which should be made trial of more frequently than it is. The dose I prefer is composed as follows: castor oil two ounces, weak infusion of mint four ounces, and syrup of lemon one ounce; a teaspoonful every fifteen minutes.

*d. Opiates.*—*Antispasmodics, opium, and other substances calculated to modify the system in general, either alone or associated with purgatives, as was the practice of Richter, Heberden, &c., scarcely deserve to be brought before the attention of the reader.* The only advantage that they could promise would be to calm momentarily and to palliate the colics, nausea, severe pains, and some of the symptoms, in fine, caused by the strangulation; but to put an end to the strangulation itself is not their province. I cannot see how belladonna administered in large doses, as is recommended by M. Chevallier, would act better than opium. The essence of turpentine, which MM. Swal and MacWilliams administer to the amount of two ounces at each dose, and in such manner that the patient may swallow to the extent of eight ounces in twenty-four hours, will never probably be made use of in France, and for that reason itself scarcely requires more than a passing allusion, notwithstanding the successes that are attributed to it in America.

*e. Enemata.*—At the same time that we are using either one or several of the preceding means, we are in the habit of soliciting a movement in the large intestine. The principal object of this being that of effecting the egress of matters lying below the strangulation, or at most to produce an anti-peristaltic motion in the entire alimentary canal, some persons confine themselves to simple lavements, or laxatives, or ordinary purgatives. Rivière, whose suggestion has been revived by M. Wood, (*Encyclog. des Sc. Méd.*, 1836, p. 64,) supposed that by propelling air through the anus by means of a bellows, we should succeed in restoring the displaced organs into the abdomen.

Hufeland and M. Van Loth, (*Gaz. Méd.*, 1830, p. 14,) professed to have cured several patients by injecting in this manner hyoscyamus or belladonna, which is also recommended by M. Pauquy. Lead water, eulogized in 1835 by M. Neuner, and which injected to the

extent of six ounces, procured three decided successes in the practice of M. Rennert, (Haxthausen, *L'Experience*, t. I., p. 635,) can yet scarcely count in its support anything more than mere assertions. But in this point of view, tobacco is the substance which has been most frequently employed. It is administered in the form of tobacco smoke, as recommended by Schaeffer, (*Acad. de Berlin*, t. VII., Append., p. 141,) by means of an apparatus which any person may invent or construct, or what is at the same time more convenient and secure, in the form of infusion in the manner of any other glyster. In this last case, a gros of tobacco to a pint of water is the usual dose ; one which it would be dangerous to exceed, inasmuch as M. A. Cooper has seen it cause a sort of poisoning, which actually took place in another case, in which it was administered to the amount of two gros, and inasmuch as the same accident has since happened in the wards of M. Marjolin. Without agreeing with Heister that it is an infallible remedy, or with Pott, that we have nothing to hope for when we have used this in vain ; and without according to it even as much confidence as Hey, Lawrence, Rose, and most of the English surgeons, it cannot be denied that tobacco injections, have, in more than one instance, removed the strangulation and rendered the operation unnecessary. In a case of this kind everything was ready for the operation. Before operating, however, M. Richerand had occasion to send for something outside of the hospital ; during this interval a tobacco injection was administered, and when they came to look for the hernia, every one perceived to his great surprise, that it had completely returned into the belly. The symptoms immediately ceased, and the young man left the hospital on the following day, to resume his accustomed labors. It is true that I afterwards saw this injection used in the same hospital, and that I myself have since employed it in twenty-five cases at least without any advantage. The *oppressio virium*, the severe colics, cold sweats, and tendency to convulsive movements, which it usually occasions, are evidences of the activity of its powers. As it determines at the same time violent vermicular contractions throughout the whole length of the alimentary canal, nothing can be more easily understood than the effects which are attributed to it in strangulated hernia. For the same reason that it is powerful, and of unquestionable utility, the tobacco may in some cases be attended with danger. Prudence would forbid its employment where the constriction is very marked, the hernia recent, purely intestinal, and complicated with inflammation, or the strangulation acute. On the contrary, it is applicable in all kinds of obstruction or strangulation of the large intestine, or epiploon, and finally in all cases where the inflammatory symptoms are but slightly developed, and where there is no danger of making tractions upon the displaced organs with a good deal of force. After having tried it to the extent of a gros in such circumstances, we may, and ought in fact, if no effect has been produced, recur to it one or more times, and increase it then to two gros at least, provided there be neither narcotism or other general accidents to be apprehended. A new method, as it would appear to me, has been suggested by the administration of injections for the relief of strangulated hernia. M. O'Beirne, (*Dublin Med. and Surg. Journ.*, Sept., 1838—Arch.,

1838, t. III., p. 329,) by introducing a gum-elastic tube into the large intestine, to the distance of fifteen or twenty inches, for the purpose of extracting the gases from it, or for pushing up injections, professes to have succeeded in eleven cases out of sixteen, and M. Grant Wilson, (*Gaz. Méd.*, 1839, p. 106,) has been no less fortunate by injecting in this manner a solution of common table-salt. I can understand, how in hernias of the large intestine, this description of remedy might possess some utility, but I confess that I cannot comprehend its efficacy in the others. I will add that the facts adduced in its favor have not appeared to me to be conclusive.

*f. Topical applications.*—*Cataplasms*, recommended and made use of by a number of practitioners, cannot in reality be serviceable except in a small number of cases. If the tumor is neither heated, nor tense, nor painful, nor actually inflamed, their utility is more than questionable, unless they should act by their weight; and if the contrary state exists, we are not enabled to wait long enough for their emollient properties to produce any effect; as however, they do not prevent our having recourse, at the same time, to the bath, bleeding, and tobacco injections, I see but little inconvenience in applying them to the hernia in cases of acute strangulation, so long as the operation is not urgent.

*g. Experience furnishes nothing in favor of leeches*, which many persons apply also upon the tumor or around its circumference, and which would be injurious in hernias devoid of inflammation. In inflammatory strangulation itself they could, at best, act only against an effect which has occurred, whereas it is the cause which we wish to destroy. The ecchymoses, moreover, which are produced by them, have the inconvenience of increasing the thickness of the hernial envelopes, of disorganizing them and rendering them more painful, and thereby rendering the operation more difficult. If they could ever be useful they would be, at the farthest, in cases of strangulation, of an inflamed epiplocele, or of some adipose or other tumor which was independent of the intestine.

*h. Refrigerants.*—Compresses saturated with *cold water*, *iced water*, *solution of chloride*, or with *oxycrat*; frictions with *acetic ether*, and all those remedies, in fact, which, when applied upon the tumor, are calculated to abstract a large quantity of caloric, may favor the reduction of hernia: 1st, as *revulsives*, by diminishing the afflux of the fluids; 2nd, by reducing the quantity of gases in the noose of the strangulated intestine; and 3d, by encouraging the peristaltic action of the alimentary tube. We thus perceive in what cases they may be suitable, and in which we may reasonably hope to derive any advantage from them. A more active manner of employing them is the one which is adopted by certain old women in the country, and which is related by J. L. Petit. This author being sent for to a young man, and being accompanied by some of his brother surgeons, was about to commence with the herniotomy, when the grandmother of the patient coming into the chamber, requested everybody to retire, saying that she herself was going to cure the boy immediately. After having stretched him naked upon the floor upon a sheet, she ran to the well to draw a bucket of water, which she suddenly dashed upon the hernia. The result was, says

J. L. Petit, who had requested permission to remain as a witness to this experiment, that the intestines almost immediately returned into the belly, and that the young man found himself cured without an operation. Any person may understand the action of such remedies, and which might be had recourse to with a certain degree of confidence, were it not that in cases where they do not succeed they are calculated to favor the development of the various kinds of inflammations which sometimes succeed to herniotomy. To leave room, however, for the gangrene of congelation, as in the case noticed by M. A. Cooper, to be apprehended, it would have been necessary for the ice, snow, or any other refrigerant, even the most active, to have been employed with very little precaution, and I doubt myself if any such accident is in reality to be apprehended.

i. In these latter times much has been said of the *hyoscyamus* and *belladonna* for the reduction of hernia. M. Speziani makes of these substances a pomade, which he spreads over the tumor; MM. Meale, Vignes, (*Thèse*, No. 208, Paris, 1837,) Joffre, Carré, Morand, Porta, (*Brit. and For. Rev.*, No. 3, p. 269,) Sorbet, (*Bull. de Therap.*, t. V., p. 96,) Neuber, (*Journ. des Conn.*, t. II., p. 86,) Chanel, (*Journ. des Conn.*, t. I., p. 94,) Perone, (*Ibid.*, t. I., p. 60.) Koehler, (*Gaz. Méd.*, 1830, p. 14,) Fuzet, (*Rev. Méd.*, 1831, t. IV., p. 211,) Bouchet, (*Journ. de Méd. de la Loire Infér.*, &c., t. IX., p. 61,) Pagès, Faye and Magliari have succeeded with the same practice; M. St. Amand has been no less fortunate in employing them as cataplasms; and M. Riberi spreads them upon a bougie, which he introduces into the urethra, and also alleges to have thereby procured successful results. Guérin of Bordeaux long since made use of bougies besmeared with preparations of opium, and introduced into the urethra, as a remedy in strangulated hernia. I would not venture to say that we ought to place much reliance on such remedies; but as they are as easy in their application as they are devoid of danger, I do not see why they might not be had recourse to when we are not under the necessity of immediately resorting to the operation. I have made use of them in six instances. The tumor besmeared morning and evening with pomade of belladonna, was afterwards covered with simple cataplasms. In two instances I introduced into the anus the same pomade upon a strong meche, and I must confess that it has appeared to do good in a number of patients. In reference to their mode of action we must wait, I should think, for a greater number of facts to be adduced in their favor before we attempt an explanation.

j. *Acupuncture*.—I shall not treat in this place of *astringent cataplasms*, *grinder's dust*, &c., and of *wild pomegranates* and decoction of walnut leaves, which Belloste states he has found so useful, since they have been for a long time universally proscribed; but I must say a few words of acupuncture and electro-puncture. As early as at the time of Paré they sometimes ventured to perforate the hernia one or more times by means of a long needle or small trochar, with a view of giving exit to the gases contained in the strangulated intestine. Pott avers that a practice like this is absurd and unworthy of refutation, and most of the moderns are of the same opinion. Nevertheless it has been put in practice in my presence on a patient

whom I operated upon immediately after. I allude to a young student of medicine in whom his father had frequently employed it with benefit. In my opinion it ought to be rejected ; it cannot be rationally employed except in enterocele which has been distended by gaseous fluids, and then one of two things must happen : either the small wound closes up at the same time that the needle is withdrawn, and then the effect is the same as if nothing had been done ; or this wound remains open, and in this case it is to be apprehended that when the intestine has returned into the belly it may allow of the escape of some portions of the liquids which it usually contains. This last accident however could not occur without great difficulty, for every traumatic perforation of the alimentary canal, the diameter of which does not exceed one or two lines, hardly ever fails to become immediately obliterated, either by the approximation of its lips or by the engorgement of its mucous membrane.

k. Electro-puncture, of which some trials have been made on dogs by M. Leroy, has not yet been as I am aware applied to man. It consists in inserting into the tumor the sharpened extremity of the wire of an electrical or galvanic circle, while the other extremity of the same circle is placed upon the tongue or in the anus, according as the hernia should appear to have been formed either by the small or the large intestine. Theory would lead to the inference that the currents or discharge of a pile of some strength directed in this manner, were calculated to give rise among the displaced viscera to such movements or succussions as to effect, in some instances, the return of the hernia into the belly. After all it is a means which may easily be made use of, and so much the better inasmuch as we might confine ourselves in place of the electro-puncture, to the application of a simple electric circle unaccompanied with needles.

I. *Recapitulation.*—Let us now place the operator provided with these various means in presence of a patient affected with strangulated hernia. Is the case one of ancient enterocele, but which has become suddenly irreducible ? If trials have already been made, he will before renewing them place the patient in a bath, or even commence by bleeding him at the arm to a great extent if he is robust and symptoms of inflammation are to be apprehended. If the taxis does not then succeed, the large intestine is then to be emptied by laxative injections, or a purgative will be administered. The process of M. O'Beirne will come next; and the infusion of tobacco in its turn, two or three hours later. We will return again to the bleeding if the strength permits, and to the bath and taxis, or even to the prolonged taxis, from which M. Nivet, (*Gaz. Méd.*, 1838, p. 481,) like myself, has obtained very decided advantages in cases of obstruction ; next will come the cataplasms or frictions of belladonna, and the bougies according to the process of M. Riberi or M. Guérin. If all this proves insufficient and there is no haste, we will have recourse to embrocations, cold topical applications, compression, and finally electricity. In cases of acute strangulation and recent hernia, the taxis, bleeding, baths, enemata, and cold or narcotic applications will have to succeed each other rapidly. If there should already be inflammation in the tumor, the tobacco injections with the apparatus of M. Vulpès (*Apparech. per Introd. Nell' int. Ret. il*

*Fumo di Tabacco*, etc., Napoli, 1838,) or any other, and electricity and compression are no longer admissible. Nor is the taxis then to be performed but with the greatest degree of precaution. If the pain and other signs of inflammation no longer leave any doubt as to the condition of the parts, bleeding and the bath would be no more indicated except as preparatives ; all topical applications must be banished and we must proceed to the operation as soon as possible. Leeches in great number and emollient cataplasms would not be applicable unless the symptoms should appear to depend upon some tumor disconnected with the intestine. When the hernia is formed of a large intestine or the progress of the symptoms is somewhat slow, we commence with the taxis or baths and then have recourse to tobacco injections, topical applications with belladonna or opium, and to refrigerants and even electricity ; but the bleeding might, or can at least, in most cases be omitted. We should proceed in the same manner when the case is one of obstruction only, and it is in such cases that during the interval between the trials with the taxis, compression by means of a suitable bandage may be of some benefit, in the same way as in cases of epiplocele, which are unattended with adhesions and inflammation. Finally, after having made trial of everything and modified the application according to the nature of the symptoms, we must no longer think of attempting to reduce a hernia of this description, whether it be that it is restricted by the adhesions or that the ring opposes to it an unyielding resistance. If there is still time, the kelotomy, whose chances of success moreover are so much the greater, and its dangers so much the less in proportion as the period is earlier at which we have recourse to it, is to be no longer deferred. As the attentions which the patient requires after the reduction are at first the same as after the operation, we shall not at the present time dwell any longer upon them.

#### ARTICLE IV.—HERNIOTOMY OR KELOTOMY, OR THE OPERATION FOR STRANGULATED HERNIA.

##### § I.—Enterocèle.

The operation for strangulated hernia is only known since the time of Rousset. Maupasius appears to have been the first who demonstrated its advantages. Aymar and Formi (*Bonet, Corps de Med.*, t. IV., p. 108, obs. 101 and p. 194) however had had recourse to it with success in the sixteenth and seventeenth centuries. Up to that period kelotomy was not performed except for the purpose of effecting a radical cure of the rupture. It is composed of several stages ; incision of the integuments, division of the tissues placed between the cutaneous envelope and the peritoneal layer, opening of the sac, and examination and appreciation of the strangulated parts, the destruction of the strangulation and the reduction of the displaced viscera—such are the various steps the surgeon proposes to take after having arranged his instruments and the patient and the assistants.

A. *Articles of Dressing*.—A perforated linen besmeared with cerate and sufficiently large, small balls and plumasseaux of lint, adhe-

sive plasters, long or square compresses, a long band or an appropriate bandage, a straight, a convex bistoury, the concave bistoury of Pott, or the straight blunt-pointed bistoury, a good pair of dissecting forceps and straight scissors, a canulated sound without any cul de sac, and some ligatures and suture needles, constitute, with the accessories which are required in every great operation, the different objects which we may have occasion for, and which are to be arranged in order upon a large flat board or upon a small table.

B. *Position of the patient and the assistants.*—The table covered with a mattress or the bed upon which the patient is to be operated upon, requires no particular directions, except that it is to be furnished in a proper manner with alezes. Nobody at the present day imitates Louis, or seats himself upon a stool between the legs of the patient, who is supported on the edge of his bed. The operator stands up or places himself upon his knees, or sits down and to the right. The patient being placed horizontally and nearer to this side of the bed than the other, is to remain here in a state of complete relaxation. An assistant watches the movements of his head and arms, another does the same in respect to the lower extremities; a third places himself in front of the operator in order to stretch the skin, sponge the wound, &c.; while the fourth is to remain free, and attends to handing the instruments.

C. *Incision of the Integuments.*—The parts are to have been previously shaved, cleansed, and wiped. If the skin is tense, thick, and adherent, the surgeon, armed with a convex bistoury, divides it in the same way as for making a simple incision, from without inwards, taking care at first not to go very deep. In the contrary case, he takes up a fold, one extremity of which he gives to the assistant, and then immediately divides it either by puncture from within outwards, or what is better, from its border to its base. This fold possesses the advantage of exposing less to the wounding of the viscera, in spite of ourselves; but the incision, which is then less regular, can never be prolonged to a sufficient extent with one cut, if the hernia is voluminous; so that all things being equal, the simple incision is generally preferable when we are sure of our hand. The wound should have the direction of the greatest diameter, and an extent proportioned to the size of the tumor. We do not give it the T or crucial form, except in some particular cases: I prefer the *crescentiform (en croissant) incision.* When the wound is at first not sufficiently long, the operator, in place of gliding successively under each of its angles a grooved sound, to enlarge it with a cut of the scissors or straight bistoury, pinches up one of its lips, and directs the assistant to pinch up the other, in such manner that the forefinger rests in the wound and the thumb upon the skin for the lower end, and the thumb in the wound and the forefinger on the integuments, on the contrary, for the upper end; slightly separating while reversing them outwards, the lips of the wound thus embraced, he then enlarges it with a convex bistoury as much as he deems necessary. By the other method we cause much more pain; the skin slips upon the sound, folds up and does not admit of being incised but with difficulty. The vessels which are opened during this first incision, are rarely of sufficient size to render it indispensable to apply the liga-

ture to them immediately. It generally suffices to make slight friction upon them, or to cause the finger of the assistant to be applied temporarily over their orifice, to prevent their bleeding: their torsion, moreover, is a very simple affair.

D. *Incision of the intermediate tissues.*—The division of the layers which come next to the skin, requires the greatest attention, and is not to be made but with caution. In fact they are not sufficiently distinct from each other, nor always sufficiently constant in respect to their relative thickness, to remove the apprehension of wounding parts which it is important to respect, or to enable us to dispense with proceeding with an extreme degree of reserve, even by feeling our way until we reach the sac. The surest mode is to seize them with the forceps in proportion as they present themselves on some salient point of the tumor, to raise up a small flap which is to be excised with a bistoury flatwise, and to repeat this operation so long as the sac is not yet laid bare. The sound being then introduced upwards and downwards, into this kind of opening, and glided as far as the extremities of the wound, enables us perfectly well to divide these layers with security by means of the straight bistoury, or even the scissors. Nobody at the present day would venture to tear them with the pointed sound of Le Dran, or the fleam which some persons made use of in the last century. It is on our approach to the sac that the difficulties commence. In certain persons or in certain descriptions of hernia, it is only separated from the skin by an excessively attenuated lamella; in others it is found at the depth of some lines, and sometimes even several inches. To reach it we are sometimes obliged to pass through various lardaceous layers, lymphatic ganglions in a state of suppuration, and circumscribed or diffused purulent collections; finally, it may be immediately surrounded by a more or less considerable quantity of dark-colored serosity, as has been seen in one instance, by both M. Travers and M. Richerand, and which is well calculated to lead to the belief that we have entered into its interior, or it may be covered by various kinds of adipose tissues, which might readily be mistaken for the epiploon.

E. *Interposed adipose tissues, (Plaques.)*—This last anomaly, the importance of which classic authors have omitted to point out, must necessarily occur frequently. Saviard (Saviard, *Nouv. Obs. Chirurg.*, p. 105,) relates one instance, and Scarpa (*Traité des Hernies, &c.*, p. 68,) another. It was also met with in a patient operated upon by M. Lisfranc, (*Arch. Gén. de Méd.*, t. XIII., p. 453.) I possess at the present time more than fifteen examples, to which might be added those of MM. Heller (*Journ. des Conn. Méd.*, t. II., p. 346,) and A. Andral, (*Thèse*, No. 293, Paris, 1837.) Though it be true that a mistake may in most cases be avoided, it cannot however be denied that we must in some instances pay particular attention to it. When the adipose layer envelopes the sac in the manner of a network, or that it is itself surrounded with a lubricated membrane, devoid of adhesions, an arrangement like this must evidently embarrass the most skilful surgeons. M. Roux, in my presence, came near making this mistake at the Hospital of Perfectionnement. After having divided the integuments, and several cellulo-adipose layers, he came down upon a brownish membrane, very distinct from the others, and which

he cautiously opened. Finding it smooth and unctuous in its interior, he supposed he had arrived into the sac. Underneath it was found a yellowish colored, porous, and very pliant mass, but no intestine. Fearing that this mass might be a noose of the intestine covered by the epiploon, M. Roux decided upon dividing it layer by layer, as he had done with the other tissues. In place of the intestine, it was the legitimate sac which soon presented itself; after which the hernia presented nothing remarkable; Boyer himself had been deceived by it. The abnormal production does not always surround the whole of the sac.

In 1829, a patient who had been inadvertently placed in the medical wards of St. Antoine, was brought down on the following day into my department. The strangulation had existed for several days. The membrane which I took for the sac being laid open, we saw before us a mass composed of two portions, one globular, black, smooth, and of the size of a small egg, situated posteriorly and inwards; the other larger, less dark, bosselated, and incasing the anterior and outer half of the first. The idea of an entero-epiplocele immediately occurred to me. But in attempting to isolate the adipose portion, in order to proceed to the reduction, I perceived that the intestine was not laid bare, and that a semi-transparent lamella still separated it from the other tissues. It was the real sac, whose neck gave attachment on its outer surface to quite a large pedicle of a true adipose hernia, which I excised. A washerwoman to whom I was sent for by M. Forget, presented an instance of a no less remarkable arrangement. I had also laid open a membrane, which might have led to the supposition of its being the sac. The tumor that it contained was trilobated, and its three lobes, which were of unequal size, were of a deep brown color. We immediately perceived that there still was another covering to the viscera, which it became necessary to divide. The inner prominence only was connected with the intestine; it had its own sac. The two others also had a distinct envelope; they were pediculated, of an adipose character, and attached to the external surface of the hernial peritoneum. I excised them after having reduced the intestinal noose, and the patient was perfectly re-established. I operated at La Pitié in October, 1831, on an old woman, who presented an arrangement precisely similar to that of the first case, and have found the same arrangement since in various forms at La Charité, both in men and women. These adipose vegetations may also assume a thousand other different varieties. Tartra came down upon a hard elongated tumor which he could not reduce, and which he took for degenerated intestine, and excised with the view of establishing an artificial anus. The patient died, but the intestine had not been touched! There was not even an enterocele, and the part that had been removed proved to be an adipose hernia.

F. A *cyst* which might have been formed from an ancient hernia or other sac, empty like that which was found in the patient operated on at La Pitié by the method of M. Belmas, or filled with liquid, as many authors have observed it, would lead to mistakes of another kind, and which may be readily understood; mistakes which might occur so much the more easily, inasmuch as the sac itself may, after having been inflamed and then transformed into an abscess, give rise

to most of the symptoms of strangulation, as has been already said above.

G. *State of the sac.*—The experienced surgeon, however, aware of the possibility of so many errors, will in almost every case be enabled to protect himself against them. The sac is not opened so long as there presents a woolly, irregular surface, and a mélange of plates or peletons of an adipose, vascular, cellular or lamellar character, or so long as the neck of the tumor is not free, and does not allow of our passing around the whole of its periphery, as high up as into the ring, by means of the nail or the extremity of a sound. Cysts, abscesses, &c. will be distinguished by their want of communication with the abdomen. The same remark applies to all morbid productions situated outside of the peritoneum. In supposing, however, that an adipose layer might be mistaken for the epiploon, what danger would there be in dividing it in order to ascertain what existed beneath it? Unless there were particular difficulties in the way, however, we should restrict ourselves to dividing the sac in the direction of the wound of the integuments. In endeavoring to separate it from the surrounding tissues, the surgeon protracts the operation, augments the amount of pain, and renders mortification of this prolongation of the peritoneum almost unavoidable if he does not immediately excise it.

H. In the most *simple hernias* the opening of the sac is an easy operation, and without any danger for one who is possessed of accurate anatomical knowledge and some degree of skill. The intestine constantly exhibits a certain inequality, and is never as uniformly globular as its peritoneal envelope, which last, moreover, is usually separated from it by a greater or less quantity of serosity or liquid matter. It would be in such cases that we might in some respects, as Louis has ventured to assert, divide with one incision the skin and principal layers which separate it from the sac, and then penetrate with a second incision into this last envelope without any further exploration. In cases somewhat complicated, such a procedure would approach to rashness, and in reality deserve the censure which has been bestowed upon it. When there is only a certain quantity of liquid in the sac, as in the cases to which M. Tessier's attention has been directed, (*Arch. Gén. de Méd.*, 2e sér., t. IV., p. 497,) this would not prevent us from recognizing the presence of the intestine in its interior. It would be the absence or excess of fluid in this pouch which might lead us into an error. It is readily perceived how easy it would be for us, in the first case, to cut down upon the viscera and divide them without being conscious that we had gone beyond the sac. It is readily understood that the difficulty would be still greater if those different parts were found united by adhesions. In the second case, the only danger is in the possibility of our confounding the sac with a large portion of intestine distended by gases or any other fluid matter, supposing in such cases that we have not yet been enabled to distinguish the sac.

I. *Hydropsy of the sac.*—The presence of a large quantity of liquid in the sac has been so frequently encountered, that I must necessarily say a few words on this subject. Saviard mentions a case of this kind, and Méry noticed one in a woman in which there was

more than a pint of liquid. MM. Liégard and Roux have also each seen an instance of the same kind. Schumcker and Siebold state that they were upon the point of being deceived by it, and of supposing that they had come down upon a hydrocele. Monro avers that he has found more than six pounds of liquid, and Scarpa more than three in a single sac. Pott frequently had recourse to puncture for a complication of this kind, and M. Lawrence also appears to have met with it. Finally, M. A. E. Maréchal has collected numerous examples of this kind noticed by him at La Charité. For this result to happen, two conditions are required: 1st. The neck of the sac must have been shut up by the strangulation, or by any other cause; 2d. The peritoneal prolongation has become the seat of an unnatural exhalation. The other affections which might possibly, to a certain extent, simulate it, are hernia of the bladder, or a hydrocele which should have an ancient closed hernial sac for its seat, as has been noticed by Bertrandi and Pelletan, (*Clin. Chir.*, t. III., p. 25, 111,) or large hydatid cysts developed in a strangulated epiploon, as mentioned by Lamorier. I have myself seen an extraordinary case. Quite a robust old man was brought into my department at St. Antoine in the month of October, 1828, to be treated for an enormous hernia which had been accompanied during the preceding five days with constipation, vomiting and other symptoms of strangulation. This hernia, which occupied the scrotum, was double the size of an adult head, heavy, distended, of a brownish color, slightly painful, and covered with veins greatly injected with blood, and without any projection on its surface. Its walls were so thick that the fluctuation was obscure, and the light of a candle furnished but little information as to its nature. The patient informed us that he had had this hernia for fifteen years, during which it had not exceeded the size of the fist, and that he had frequently succeeded in returning it into the belly. I did not hesitate to open into it, adopting the same precautions as for an ordinary hernia, that is to say, by dividing its envelopes layer by layer, and on one point only. As soon as it was perforated a clear liquid like urine escaped from it in a jet and with considerable force. I immediately enlarged the opening and drew from it more than *three litres* of serosity, which was slightly turbid. Its upper part, moreover, contained an entero-epiploce which was as large as the fist, strangulated and presenting several gangrenous patches upon it. Several analogous cases have since occurred at La Charité. M. M'Ilwain, (*Encyclog. des Sc. Méd.*, 1838, p. 94.—*The Lancet*, 21st July, 1838,) in operating upon a woman for crural hernia, found a large cyst filled with serum; through a neck he was enabled to reach a projection of the intestine, which was liberated, and the patient recovered. Was this anything else than a hydrocele of the sac? (See article on *Hydrocele*.) By calling to mind the natural characters of simple hydrocele and cystocele in such cases, we shall experience no difficulties. The mistake, moreover, would not be very serious. Only it is necessary to recollect that a complication of this kind renders the efforts for the taxis nearly useless, seeing that they are expended upon the liquid before reaching the intestine, and that, on the other hand, this liquid must favor the strangulation by its reaction on the viscera. The important point therefore is

here, as in every other case, not to confound the sac, which is in this manner filled with liquid, with the intestine. To prevent the possibility of our succeeding in this, it would be necessary to suppose an intimate adhesion between these two parts, a sort of blending of the visceral with the parietal peritoneum of the tumor, which is an exceedingly rare circumstance except in very ancient or in caecal hernias.

J. *To distinguish the Intestine.*—Unless there should be no sac, or where even adhesions should exist, we cannot conceive how it would ever be absolutely impossible to distinguish the intestine if we proceed with proper caution. The sac in its natural state is nothing but a simple lamella, and cannot be surrounded except by *lamellæ*. Whatever be its thickness, and whether that depends upon the cellular tissue which covers its exterior, or upon accidental layers deposited upon its internal surface, it will always present itself under the form of concentric laminæ irregularly superimposed upon each other; while the existence of a fleshy tunic with a double layer of fibres underneath a completely adherent serous membrane, will prevent our mistaking the intestine or penetrating into its interior if we are cautious in avoiding it. A note of the translator of Scarpa, in which it is said that a surgeon divided the intestine because the adhesions which united it to the sac did not allow him to distinguish those two parts; also the accident, which happened in 1831, in one of the great hospitals of the capital, to the surgeon who was at the head of that institution, and who also opened into the intestinal canal while operating for a hernia; as well as many other mistakes of the same kind, appear to militate, it is true, against the opinion which I have just expressed; but in examining into these different cases more closely, without reference to the operators, and with a desire to ascertain the exact truth, we shall readily perceive that the error was not unavoidable, and that it would be much more proper to impute it to the inattention of the operators than to the nature of the circumstances. For example, the practitioner mentioned by M. Olivier, states that before reaching the sac he was obliged to pass through a cyst filled with brown colored serosity. Now it appears to me evident that this pretended cyst was the sac itself, which was not suspected. That being the case, it is very natural that the intestine should have been cut into under the misapprehension that the hernial envelope only was being divided.

K. Be the case as it may, we can proceed in two different modes in order to *open the sac*. The first, and which is generally followed, consists in seizing with a common forceps the point which appears to be most free, in order to raise up from it a flap which is excised by directing the bistoury horizontally underneath the extremity of the forceps. The liquid, if it contains any, immediately runs out through this opening; if not, it is the intestine which immediately protrudes into it, and which is distinguished from the sac by its greater suppleness, by its smoother aspect and other natural characters. A sound inserted into this aperture then enables us to enlarge it as much as we desire, by protecting the viscera against the action of the probe-pointed bistoury, or blunt-pointed scissors which should then be used. The other method is apparently more dangerous, and

on that account is generally censured by authors. Nevertheless I have always found it more simple than the preceding, and I would not hesitate to give it the preference if we could always count with sufficient surety on the hand of those persons who operate for strangulated hernias. While the left hand makes sufficient tension upon the sac or tumor, the right, with a straight bistoury held like a pen, directs the point gently, and with small cuts upon the projecting part, divides them layer by layer, enables us in this manner to distinguish all the lamellæ which present themselves, or to stop when we wish to do so, and to penetrate with full as much certainty as by the ordinary process. It is a rule to open the sac down to the lower part of the tumor, in order that this part may not serve as a receptacle for pus or other liquids which might accumulate at the bottom of the wound. Many surgeons advise to do the same for the upper part; but others recommend that we should not incise in this last direction only to a certain distance from the ring. It is alleged that the patient is thereby less exposed to peritonitis, and the surgeon less in danger of making a mistake when he divides the ring; but it becomes then almost impossible to insert the bistoury between the neck of the serous tunic and the aponeurotic opening, as it is said has sometimes happened. If names like those of J. L. Petit and A. Cooper had not become its defenders, such minute surgery would not have required to be specified. Is it in fact possible that they have seriously discussed the question of ascertaining whether it was advisable or not to prolong to the distance of a few lines more or less the incision of the sac in one direction or another? Those who have performed the operation for strangulated hernia, will not be able to understand how the débridement can be made either more or less easy, or peritonitis be more or less avoided by one than by the other of these modes of procedure. All that we have to accomplish is to lay bare completely the root of the parts that are to be reduced. As to the rest, it is a matter of little importance whether the incision of the peritoneal prolongation be extended as high up as into the ring, or arrested at some lines this side of it.

*L. Expansion and adhesion of the viscera.*—The viscera being now free from every impediment as soon as the sac is largely laid open, frequently acquire suddenly a size much more considerable than would have been at first supposed; so much so, as to lead to the belief, that an additional quantity of intestine has escaped through the hernial opening. When the hernia is voluminous, the inflammation is frequently found to have glued the different duplicatures to each other or to the sac. In such cases, slight tractions, or the fingers glided between the parts, will be found sufficient to separate them. Should ancient adhesions prevent us from isolating them completely, a bistoury or the scissors would soon accomplish the object. Those general adhesions only are to be respected, which are so intimate, as to make it impossible for us any longer to recognize any line of demarcation between the sac and the hernia. In endeavoring to destroy them, it would be a difficult matter not to make some mistakes in the direction of the intestine; or if in order to obviate this danger, we should direct the instrument more to the outside, the viscera might be left covered with too thick a layer of ex-

traneous tissues not to render their reduction dangerous. Should they be found to have been strangulated by a rent in the sac, or within the sac itself by a rupture, or a bridle of epiploon, or by an accidental band, or in any other way, we must also begin by liberating them, in order to be enabled to unroll them, and to ascertain if they are not the seat of some degenerescence, or ulcerated, or gangrenous, in a word, if they are in a perfectly sound condition.

M. *To draw upon the intestine.*—After having thus unrolled them and spread them out, we are then to proceed in replacing the intestines into the belly, if the constriction of the ring presents no obstacle to this step. In fact, in a certain number of cases, the thing is practicable; in the first place, when the abdominal opening is not the seat of the strangulation; again when the course of the matters has been interrupted only by too sudden an inflexion of the organs upon the hernial orifice; and lastly, when the substances accumulated in the internal noose, are sufficiently fluid to enable us, by making use of exact pressure upon them, to cause them to return behind the ring. Before doing this, however, whatever may be the condition of the parts, it is recommended, even after having destroyed the strangulation, to draw out all the portion comprehended in the aponeurotic track. Without this precaution, it is said, we should incur the risk of returning into the belly a contracted or ulcerated portion of the intestine. There results from this, moreover, as is generally considered, another advantage, which is, that the noose being made longer, the matters it contains would be dispersed over a greater surface, distend the intestine less, diminish the size of each of its rings, and in this manner render its reduction more easy. At the present time, I have laid aside this practice. By following it we might enlarge a laceration or ulceration in the intestine, which latter, moreover, is by this means rendered more difficult of reduction. If we omit it, we evidently favor, in place of diminishing the prospect of the cure of lesions which might exist behind the ring.

N. The *coarctation* of the intestine in the ring, is a result admitted by all authors, and one which the experience of Ritch had long since placed beyond dispute. In a patient operated upon by this surgeon, the accidents persisted after the reduction, when the opening of the dead body explained them; the portion of the alimentary canal which had been strangulated, was found so much contracted that it was with difficulty that an ordinary quill could be made to pass through it. Other examples of contraction of the intestine remaining in the belly, have been related since; I have myself seen some, but it appears to me that we are deceived as to their nature, as they have nothing about them which is organic or permanent. They are immediately removed by means of the fingers, when they present themselves to our notice; a purgative generally removes them after the operation, and it would be barbarous treatment to stretch the intestine below, as has been proposed, in order to enable us to distend them from the interior to the exterior before proceeding to reduction.

O. A more frequent lesion, and one which has not been sufficiently noticed, is the *ulceration* of the intestine upon its external surface. The solution of continuity in such cases, presents itself under the form of a groove, which is from one to two lines broad, situated some-

times on one, sometimes on various points, and at other times even upon the whole extent of the circumference of the intestine, while it corresponds to the fibrous circle which has produced this disorganization. It might be said to have the appearance of having been caused by a packthread drawn tightly around the intestine; so long as the peritoneal coat alone is affected, the muscular tunic not completely perforated, or that the mucous coat preserves its integrity, we may return the whole into the abdomen without danger; but the greatest degree of precaution would be necessary under such circumstances, for these different tunics being at the same time softened, the slightest traction upon them would instantly cause their rupture, as I have seen in a woman operated upon in the presence of M. Roux, and who died on the following day. M. Lawrence and M. Roux, who have more strongly pointed this out to the attention of practitioners than M. Boyer, might have added that this groove has sometimes resulted in a perforation of the entire intestinal canal, and in the production of a fatal effusion, the origin of which would be very erroneously explained by a gangrenous ulceration. In 1824, a woman 55 years of age was brought to the Hospital of Perfectionnement. I operated upon her immediately for a strangulated hernia, which had existed for 40 hours. After having liberated the intestine, I reduced it with the exception of its most projecting portion, which was in a state of gangrene, and the aperture in which I attached to the ring. The patient died on the next day but one. The circumference of the organ, which had borne the constriction, exhibited the ulceration above mentioned, and there existed near its mesenteric border, a perforation through which the matters had passed into the peritoneal cavity.

P. *To remove the strangulation.*—Strangulation at the neck of the sac takes place only in ancient hernias, and in those which have come down and been reduced a number of times. In the others, in fact, it would be difficult to conceive how this ring should have become thickened, contracted, and indurated to such degree as to interrupt the course of the matters in the intestine. When it exists, we recognize it by the mobility of the peritoneal prolongation, which permits itself to be pushed up into the belly, drawing the intestine with it, also by the freedom of the ring in spite of the constriction of the viscera, and by the facility with which we can introduce the finger either wholly or in part, between the fibrous circle and the root of the sac. If the strangulation is formed by the external orifice of the hernial canal, the nail directed upon this point will immediately give evidence of it. When, on the contrary, it is more deeply situated, the opening in question is neither tense nor completely filled up. In this case we shall know that it is not the entrance into the serous cavity which has caused it, but that of the aponeurotic canal, provided the incomplete reduction of the intestine is not accompanied by any slipping of the sac.

I. *Dilatation.*—Two different methods have been proposed to remove strangulation, viz., *dilatation* and *incision*. Dilatation, which had already been eulogized by Thevenin, and afterwards by Arnaud, has been especially recommended by Le Blanc. Various instruments have been devised for that purpose. The double gorgeret,

the two branches of which open and shut in the manner of a dressing forceps, would certainly fulfil the object better than any kind of crotchet or dilatator whatever, if the method itself was worthy of being retained ; but the only advantage it possesses, that of protecting us from any lesion of the vessels, is of too little value in comparison with its inconveniences, to cause it ever to be adopted in general practice. The impossibility of applying it when the strangulation is very deep, its insufficiency in the majority of cases, the contusion of the viscera which is generally produced by it, and the enlargement instead of the ultimate contraction of the ring, which would almost inevitably result from it, sufficiently justify, in my opinion, the oblivion into which it has fallen, and I doubt if M. Truestedt, who, intimidated by the fear of wounding the arteries while liberating the stricture, has again proposed its employment, will find many imitators among his cotemporaries.

II. *Incision*, or the débridement, consists in dividing at one or several points, the free border of the constricting circle. This is the delicate and dangerous part of the operation ; it incurs the risk of wounding the organs contained in the ring, and especially the vessels of the contour of the hernia. A multitude of different processes also have been proposed to effect this object.

a. The scissors, curved on their border, employed formerly, are, as they should be, proscribed at the present day. The same remark applies to the *bistoury of Bienaise*, an instrument which seems to have suggested the idea of the lithotome of F. Côme. The *concave bistoury of Pott* is the one, at the present day, which is substituted for all other kinds of hernial bistouries. M. A. Cooper has modified it in such a way that its cutting edge has no more than an extent of six to eight lines, and stops at the distance of from two to three lines from its button-pointed extremity. According to M. Tesse of Douai, (communicated by the author,) the cutting edge of M. A. Cooper's instrument would be made still more commodious if it were made convex upon a straight bistoury. Constructed in this manner it incurs less risk of wounding the parts which, during the débridement, might be interposed in front of its heel. This slight advantage ought to be adopted, but we must guard ourselves against exaggerating its importance. I would even remark that in certain cases, when the abdominal opening has very thick borders, and when the saw-like movements, or those *backwards and forwards* become necessary, it is less commodious than the bistoury of Pott properly so called. The oval plate which *M. Chaumas* has attached upon its convex border in order to protect the intestines, is too troublesome and of too little utility to be spoken of more in detail. The object of *Dupuytren*, who has placed the cutting edge upon its convexity, and which most of those who have since spoken of it do not appear to have precisely understood, was to render the curved bistoury better adapted to divide the tissues from before backwards, and from the centre to the circumference of the ring. From thence it was adapted only to certain cases, and we shall soon see that even in the cases mentioned, the simple straight or common convex bistoury may be advantageously substituted for it. The button-pointed *bistoury*, sharpened that its edge may represent a file, (*aiguisé à la lime*), invented

by J. L. Petit, and the edge of which, too coarse to divide the vessels, would be sufficiently sharp to cut through the aponeurotic ring, is of no value notwithstanding all the eulogies which have been bestowed upon it. As to the ordinary *blunt-pointed bistoury*, in many cases it is often less convenient than the curved bistoury, inasmuch as we are sometimes compelled to pass through a track more or less tortuous to reach and destroy the constriction.

b. *The winged sound* of Méry which was supplanted by the invention of M. Chaumas, and which was intended to fulfil the same indication, is no longer found among the instruments of surgery; so that in reality the bistoury of Pott is the only special instrument which has been retained for the débridement of strangulated hernias. When there are no vessels that we are in danger of wounding, the concave or even the simple blunt-pointed bistoury, if the debridement is to be made upon a ring and not in the canal, will answer and may be substituted. The nail of the left forefinger is to be first introduced between the intestine and the constriction which is to be divided; the pulp of the finger will then serve as a guide to the instrument, the point of which is to be made to penetrate into the belly before turning its cutting edge upon the resisting border. An assistant then attends to the viscera and separates them from the point which is to be divided; another assistant proceeds in the same manner in respect to the lips of the wound. The surgeon combining the movements of his right hand which holds the handle of the bistoury with those of the left forefinger which supports its back, then presses upon the ring which he cuts with a saw-like movement until it yields and is thoroughly divided; which is made manifest by a sound similar to that of breaking a piece of tin or unrolling parchment. However, as this bruit is caused by the division of fibrous tissue, it would be unnecessary to wait for it when the débridement is made only upon the neck of the sac.

c. On the supposition that we should use a *director*, it would be only as an auxiliary to the forefinger; we should glide upon it the bistoury which it is to support during the débridement. In such cases it is well that it should have a cul de sac and be curved in such manner that the concavity of its extremity may sufficiently well adapt itself to the inner side of the abdominal wall to prevent any portion of the viscera from being interposed in front of it, and thereby incurring the risk of being divided at the same time with the hernial opening. It is in such cases that the grooved spatula of M. Vidal might be conveniently substituted for the ordinary director. If it were absolutely necessary to make use of a straight bistoury or one without a blunt point, all these precautions doubtless would be of service; but of what importance can they be where we use the bistoury of Pott or any other bistoury whatever? Are not these rules more embarrassing than in reality useful?

d. *Process of Bell.*—A convex bistoury or one with a broad point, like most of the English bistouries, with its back supported on the pulp of the left finger, was directed by Bell in front of the ring, which it divided with small cuts, fibre by fibre, from below upwards or from the centre towards the circumference, and from the cutaneous towards the peritoneal side, always taking care that the edge of the

nail went a little beyond the point of the instrument. By this means we remove the strangulation before arriving at the *fascia propria*, in which the arterial vessels are situated, while no difficulty exists in giving to the incision all the extent which is desirable. This process, the advantages of which I endeavored to demonstrate in 1825, and which M. Colson and afterwards M. Delloeuy have since reproduced as belonging to them, in the first place is applicable only to a strangulation disconnected with the neck of the sac, and that which would be situated at the anterior orifice of a hernial canal; in the next place it would be impossible or dangerous to have recourse to it, when the circle to be divided is deeply situated or imperfectly defined. However, if we were desirous of making use of this process, the most simple kind of bistoury, whether convex or sharp-pointed, would answer full as well as the bistoury of Bell. There is much less danger moreover of wounding the vessels than is generally supposed. These being enveloped in the cellular layer which lines the peritoneum and separates it from the *fascia transversalis*, are always thrown to the distance of at least two lines to the outside of and upon posterior surface of the ring, and this because the internal opening of every hernia flares like a funnel, and that the viscera themselves, by being introduced into it have separated the vessels from it to a greater or less extent. On the other hand, they are sufficiently pliant and generally so movable as to escape in front of the bistoury rather than to run the risk of being divided by its cutting edge, should we happen to come in contact with them. When the strangulation is situated in a canal, we cannot perceive the necessity of making the point of the instrument penetrate into the belly, nor consequently what danger there would be of wounding the blood-vessels.

e. *Repeated Debridements*.—In a case of necessity, moreover, there is a mode by which we may escape every inconvenience of this kind, with almost absolute certainty, in cases where we are obliged to pass through the entire track of the hernia. This mode consists in making on the border which strangulates the viscera two, three, four, five, or even ten incisions instead of one. In multiplying them in this manner, we need not give to any of them more than a line or a line and a half of depth; the enlargement of the opening would nevertheless be considerable, and the vessels in reality will incur no risk of being wounded. The first idea of this process, which, with M. Vidal, I would call multiplied debridements, and which is already found mentioned in Scarpa, and even in Junker, has long since been applied in vaginal uterotomy. M. Mance, of Lyons, had spoken of it in the year 1826, and it would seem that Dupuytren also adopted it in some cases. But it is to M. Vidal that we are indebted for having established it as a precept in 1827 and in 1831. M. Delloeuy has proposed to associate it with the method of Bell. For my own part, I have frequently made use of it in practice, and have every reason to consider it worthy of the serious attention of the operative surgeon. M. Belhomme, (*Arch. Gén. de Méd.*, January, 1831, p. 114,) M. Viguerie, (*Vignes, Thèse*, No. 208, Paris, 1837,) and M. Coudray, (*Bull. de Théráp.*, t. XII., p. 161,) have also pointed out its advantages.

*f. What extent ought to be given to the debridement?*—According to certain authors, an incision of more than two or three lines in depth, would, by enlarging the ring too much, render the return of the hernia almost certain, even though there should be no risk of wounding the vessels. There is no doubt that we should confine ourselves to a small incision, when the constriction is slight, and that the reduction does not require any thing more. On the contrary, however little we may feel the necessity of making a *larger debridement*, the practice of Sharp, Hey, and Dupuytren, and the cases of M. Sanson, (*Journ. Hebd.*, t. V., p. 465; t. VI., p. 81,) as well as those of my own, prove that there is no reason for refraining from it. The incision of two lines repeated on many points, or the multiplied debridements, do not in this respect leave any excuse for those who might be deterred by the fear of coming into the vicinity of important vessels. As to the *relaxation of the hernial opening*, we cannot conceive that it is a subject of much apprehension, unless it be in those cases of long slits which are only rendered necessary in certain rare cases of deep-seated strangulation. Should the wound suppurate, as it almost always does, the inodular tissue which is formed in front, or even at the centre of the ring, in such manner as to constitute the cicatrix, frequently presents a greater degree of resistance to the viscera, than the natural tissues would have done. Under this point of view the multiplied debridements, moreover, would still deserve the preference, because the more numerous the scarifications of the ring, the more solid is the cicatrix that will follow, and the more are the chances that will exist for the development of the elastic tissue in question.

*g. Without opening the sac.*—Some authors also have supposed that it would be advantageous and practicable to divide the stricture without opening the sac; that we should in this manner have an operation attended with but little danger, inasmuch as it would not incur the risk of peritonitis, so common after the usual operation; the viscera, for the same reason, would escape all danger of being wounded; while the opening of the sac, which is usually attended with so much fingering, being dispensed with, the kelotomy could be performed with confidence and promptitude, and with but little pain. In such cases, moreover, the debridement in itself is attended with no more difficulty than in the ordinary process. The bistoury is inserted between the fibrous ring and the neck of the sac, in place of passing between the sac and the viscera; the root of the hernia is isolated with somewhat more caution, in order to be better enabled to recognize the external surface of the serous prolongation at its egress from the abdominal opening, and this constitutes the whole operation.

J. L. Petit, who became the advocate of this process, to which Franco, Rousset, Paré and some others had already drawn the attention of practitioners, ascribes to it, as Garengeot and Ravaton have since done, so many advantages, that we ought not at the present day to follow any other if they had a real existence, and were not destroyed or counterbalanced by its inconveniences, which are still greater. The radical cure, which it is pretended may be obtained by this process, is certainly less probable than

by opening the sac. If we reduce the hernia without divining its peritoneal envelope, it is to be apprehended that the parts contained in the sac may have become the seat of alterations which it is important should not be overlooked. To what accidents might we not be exposed if the intestine were gangrenous, ulcerated, contracted, rolled upon itself, strangulated by a bridle, or lodged in a rent of the epiploon, or should many of these parts be found glued together among themselves? A patient operated upon under such circumstances, by M. Cooper, (*Gaz. Méd.*, 1837, p. 50,) sunk rapidly. In cases of adhesion the reduction would be impossible, and this description of débridement would be insufficient in every instance where the constriction was produced by the neck of the sac. Let it be added also, that the serum which might be found in the hernia, as has been said above, could not be returned into the belly without giving rise to some apprehension. This method, nevertheless, which in a case of necessity might be employed successfully in recent hernias, and such as were of small size, does not deserve the neglect into which it has passed. Certain cures adduced in its favor by M. Gendron, (*Bull. de la Fac. de Méd.*, t. VI., p. 131,) Beauchêne, M. Key (*Arch. Gén. de Méd.*, 2d ser., t. IV., p. 497,) and other modern practitioners, who have supposed themselves the authors of it, satisfactorily show that it might still be applicable. Having laid bare the sac and divided the ring, the operation, if we have succeeded in returning the hernia, is evidently reduced to a species of *taxis*; and no one would venture to maintain that, all other things being equal, the consequences of the *taxis* could be as formidable as those of the ordinary operation for strangulated hernia. What I have said, therefore, for and against the *taxis* in general, is applicable to the débridement without opening the sac.

*h. Process of Franco.*—Another kind of débridement, which it would appear goes back to the time of Franco, is the one which is recommended by Pigray. It consists in making an incision into the parietes of the abdomen a little above the strangulation, in such manner as to be enabled by introducing the fingers into the wound, to draw back the intestine and return it into the belly. Rousset, who wrote a little before Pigray, says that a process like this had been frequently adopted by Duval and his son as well as by Maupas. Heister, who ascribes it to Cheselden, was evidently deceived on this point. The attempt of the English surgeon appears to have been that only of the usual débridement, except that it was by a very large incision. It is sufficient I presume, to mention the operation in question, to demonstrate its dangers and absurdity. If, after having incised the anterior opening of the hernial canal, the reduction should be attended with any difficulty, it would be necessary, by means of the finger, to explore the depth of this passage, and to ascertain if there did not exist a second strangulation in the direction of the belly. If in this case the constriction depended upon the sac, we might by drawing upon it by means of the two lips of its external division, bring it into the wound and divide it without danger, throughout the whole extent necessary, by means of the blunt-pointed scissors or a bistoury. When this posterior strangulation, on the contrary, is caused by a fibrous circle, the traction made on the

neck of the sac will not be sufficient; we must then make use of the curved bistoury, guided by the finger or the director, and proceed in the same manner as for an external strangulation.

III. *Reduction.*—The obstacle which existed to the return of the displaced organs being removed, nothing more remains to be done than to proceed to the reduction, properly so called.

a. After having dispersed in a uniform manner the matters in the noose before us, we grasp it near the ring with the thumb and two first fingers; the right hand embraces the portion which has protruded the last, pushes it back by making it pass between the fingers of the left hand, which prevent it from coming out again, while another portion of the intestine is to be grasped and reduced in the same manner, and so on in succession until the whole shall have returned into the belly. The forefinger is then introduced into the canal, in order to ascertain that the intestine has properly resumed its natural position, that it has not deviated through the tissues of the abdominal walls, that the sac has not followed it, and that it is actually free of any bridle or any adhesion that might be calculated to interfere any further with its functions.

b. When a *strangulation remains* at the posterior part of the sac, and that this latter has contracted but feeble adhesions with the parts which surround it, and if the hernia is not of very large size, it may return in mass, by pushing before it the circle which strangulated it. Le Dran is one of the first who pointed out this fact, and which many surgeons have since mentioned. Under such circumstances the intestines slip in between the peritoneum and the parietes of the abdomen, and sometimes remain there and become fixed. As the constriction has not been destroyed, there ultimately takes place a laceration and afterwards an effusion into the abdomen. Arnault, De La Faye, Leblanc, Bell, and Sabatier, have noticed cases of this kind, and Dupuytren also appears to have met with several. It is not in all cases, in consequence of the resistance of the sac, that the hernia returns in this manner without ceasing to be strangulated.

c. If the strangulation is situated at the internal opening of the canal, and has not been removed, the *intestines* may also become lodged *between the fascia transversalis and the muscles*, separate those parts, and remain there equally as well as between the aponeurosis and peritoneum. An adult, twenty-eight years of age, whom I operated upon for an enterocele in 1823, at the hospital of Perfectionnement, presented an instance of this peculiarity. After having divided the external opening of the canal, I neglected to explore the posterior ring, and proceeded to the reduction. As I heard no gurgling, and as the wall of the belly still projected, I passed my finger to the interior of the peritoneal cavity, where I recognized that the reduction was incomplete. The intestines were brought to the outside, and the left forefinger passed into the bottom of the wound, soon showed me the existence of a second strangulation, and which was produced by the entrance of the fibrous canal. I effected the debridement, after which the reduction no longer presented any difficulty. We must therefore distinguish the return of the intestines, between the peritoneum and the aponeurosis, from that which takes place between the aponeurosis and the muscles, or between the dif-

ferent muscular layers of the abdomen, and not confound the obstruction which is produced by the neck of the sac, with that which is owing to the contraction of the posterior ring of the hernial canal. When an accident of this kind has taken place, the first thing to be done would be to reproduce the hernia. We effect this, by inducing the patient to cough, or to make some exertions, and even to get up. Quite frequently also the viscera come out of themselves. If we can reach them, however, with the finger, it is a still more certain mode to pinch them up and draw them towards us, doing this with all the necessary precautions. If the difficulty arises from the neck of the sac, tractions made upon the portion of this envelope which has remained in the wound, would be frequently an excellent means, as Dupuytren moreover has long since shown. None of these resources, however, would be a certain guarantee of success. Chopart, Lobstein, and other experienced practitioners have seen the patient perish, notwithstanding they had been enabled, in this manner, to reproduce the hernia.

d. There is still another circumstance which sometimes prevents the organs from being immediately returned into the belly; this is the existence of an *ancient and large sized hernia*.

J. L. Petit having succeeded in reducing a tumor of this description, after much difficulty and fatigue, perceived that the symptoms continued and did not cease until he had allowed the viscera to come out again. He explains the fact by saying that the abdominal cavity had become habituated to the absence of the organs, and so contracted as to be incapable any longer of readmitting them, in such manner that they had in fact, he says, *forfeited the right of domicile*. When we reflect upon the distensibility of the walls of the belly, and that in the course of the same day they will allow the stomach and rest of the bowels to acquire double or treble the dimensions they had a moment before, it is difficult to comprehend how their resistance alone should be capable of rendering the reduction of any hernia whatever impossible or dangerous. Is it not more probable that in the neighborhood of the neck of an ancient and voluminous hernia, adhesions have become established between the organs to such extent as to render its return difficult; or that these viscera, which have been protruded for so long a time, give rise to accidents, because after the reduction they continue pressed together, agglomerated and united in a mass, and do not uncoil themselves freely behind the ring? This reflection, which occurred to me a long time since, and which Petit the son (*Mem. de l'Acad. de Chir.*, t. II., p. 70, 1819,) had not overlooked, deserves, in my opinion, to be taken into account. This however should not lead us positively to deny the explanation of J. L. Petit, which is applicable in reality to young and vigorous persons whose abdominal parietes are endowed with a great degree of elasticity and a certain thickness, and to those who possess a great embonpoint, and in whom the epiploons are loaded with fat. In conclusion, it is better to leave the intestines in the sac, after having freely liberated them, than to bruise and injure them by persisting in attempts to reduce them. Experience has shown that retained in this manner externally, they ultimately return into the belly gradually, either entirely or at least a very large portion of them. The

horizontal position and debilitating regimen which the patient is to be submitted to, gradually produces in the belly a species of void which favors in a remarkable degree in such cases the effect which we are desirous of producing.

e. There are a number of *alterations*, moreover, in which the return into the belly would unquestionably be the best remedy. Thus the *concentric ulceration* should not deter us if it is limited to the outer coat, or even if it has reached to the muscular membrane, if, in a word, it has not perforated the intestine completely. Nor is the coarctation of the displaced organ always a counterindication. If when recent and not excessive, it allows the alimentary canal to retain at least half its natural dimensions, there is reason to hope that it will ultimately disappear in the abdomen. Gangrene is the accident which is most seriously obnoxious to every attempt at reduction; but for the same reason we must not allow ourselves to be imposed upon by false appearances. However slightly acute the strangulation may be, or however trifling may have been the inflammation or the duration of the symptoms, the intestine contained in a hernia will usually be found to be of a deep red color. Frequently it will be found to be brown, blackish or violet colored. Its peritoneum may be separated by small flaps, and this part may have lost its smooth, moist aspect, and will appear rugous, without however being gangrenous. The fetid odor of faecal matters, which some persons have laid down as characteristic, might also lead to a mistake. The same remark applies to the slaty, grayish or ashy tint. If its tunics are not shrunk and flabby, and as it were folded on themselves, if it resists the tractions made upon it, and continues to be dense and shining, if the thickness of its walls appears to have augmented in place of having diminished, if it retains some degree of heat, and that this heat is uniform upon all its points when it has remained some time in the air, and if no perforation exists, there is no gangrene; we must, nevertheless, when intimate adhesions, which it is found impossible to destroy, are encountered, effect the debridement as in ordinary cases; only that it is advisable to liberate largely, in order that the free portion of the viscera may afterwards be made to return into the belly. The rest of the gut is left in the sac, which is covered with compresses saturated with emollient liquids, as in the case of irreducible large-sized hernias. The organs being relieved of their constriction, and gradually drawn upon by those of which they are the continuation, frequently succeed also in gradually returning of themselves into the belly, or at least no longer form in the ring anything more than a slight tumor, which may afterwards be kept up by a concave pelote.

## § II.—*Epiplocele.*

Epiplocele existing alone rarely strangulates to such degree as to require debridement, but it is quite common to meet in the same sac a noose of intestine and a more or less considerable portion of epiploon. In such cases it is advisable before dividing the stricture, to ascertain if the opening has not contracted adhesion with the neck of the sac or the periphery of the intestine. It is also proper to

make the debridement upon a point where there is no epiploon, in order not to incur the risk of wounding any of the vessels, sometimes quite large, which are dispersed over this membrane. Though it usually presents itself the first on opening into the sac, we must nevertheless commence the reduction with the intestine as soon as the strangulation has been removed. The reduction of the epiploon is always attended with more difficulty. It has almost always undergone some alteration. If it is adherent to the sac only by means of bridles or filaments, nothing is easier than their destruction. But whenever the adhesions are close and lamellar, it becomes almost indispensable to remove the part. If it has remained a long time in the hernia, it becomes loaded with fat and is transformed into an adipose mass; or it doubles upon itself and becomes covered with pelotons, cylinders and hard, shining tumors, which have been compared to scirrhi. We meet with those, moreover, of an infinite variety of forms, and it would be as impracticable as it would be useless to describe them all. If such masses were reduced with the viscera, supposing that this could be done, there are some of them whose resolution we might count upon; but this could happen but rarely, and should they be ever so slightly voluminous, their presence in the abdomen would expose to too many dangers to venture upon their reduction.

I. *Their excision* is unattended moreover with danger when they are pediculated, as frequently happens, and when it is not necessary to excise them through a sound portion of the epiploon. M. Payen and myself operated for an entero-epiplocele in which many of these productions were developed. One which was four inches long and fifteen to eighteen lines in thickness, was adherent to the bottom of the sac by means of an epiploic band which was still recognizable, and was continuous in the direction of the belly with the same membrane by means of a narrow lamella, which was so slightly vascular that its excision was effected without giving rise to the slightest discharge of blood. Another which was of less length but far more dilated in its middle portion, and which had also a broader root, was removed in the same manner and without being attended with any more inconvenience. If their root moreover should appear to include vessels of a certain calibre, nothing would prevent our strangulating them by means of a double thread before completing their excision. Should the epiploon have preserved its natural state, it ought to be reduced. For this purpose it is to be pushed back by degrees, commencing as in the case of the intestine by the portion which had come out last, after having thoroughly liberated it from all its adhesions and from every kind of duplicature. When it is irreducible some persons recommend, as M. Vidal (*Pres. Méd.*, t. I., p. 216) still prefers, that it should be left in the wound, asserting that it will return by degrees and that a concave pelote will afterwards keep up the portion which remains outside. M. Simonin, (*Décade Chir.*, 1838, p. 45,) by proceeding in this manner, was enabled to cure his patient, though some accidents had occurred. Though excision is more expeditious and satisfactory at first sight, it has not been adopted but by a small number of practitioners. There are three modes of performing it; 1st, in the event of gangrene, to excise

between the dead and living parts; 2d, whether there is a gangrene or not, to divide through the living parts, to apply no ligature, and then to proceed to the reduction; 3d, to divide through the living parts and to ligate separately all the vessels as they successively appear.

*The first method* is bad, because however small a quantity of mortified tissues may be left, their return into the abdomen must necessarily be dangerous, while if the bistoury is carried through parts that are still living, we should incur the risk of causing a hemorrhage.

*The second* has been advocated by Caqué de Reims, who enumerates nine successful cases in its favor. Like this author, I am satisfied that the ligature upon the vessels of the epiploon is not always indispensable, and that in many cases they would cease to bleed of themselves after the expiration of a certain period of time. Nevertheless I should not venture to sanction his process as a rule. I adopted it in one instance in a patient of M. Florence. Up to this point the operation presented nothing peculiar. It then became necessary to remove a portion of the epiploon. The vessels scarcely gave out any blood at first and I proceeded to the reduction. In the evening the blood issued from the wound to a certain extent, when syncopes and swoonings supervened, accompanied with cold sweats, and though the vomitings had ceased, and the matters had resumed their course in the alimentary canal, the woman died ten hours after having been operated upon. This suffices for me not to incur hereafter an exposure to such dangers.

*The third method* is the one adopted by Boyer. To perform this the surgeon begins by spreading out and unfolding the epiploon, in order that he may have to divide through one *membrane* only; then excises with the scissors or bistoury the portion he wishes to remove; immediately seizes with the forceps each vessel as soon as it is divided and forthwith applies the ligature to it. This being done, nothing more remains than to push back behind the ring the parts that have been preserved, and to gather the threads on one of the sides of the wound. The inconveniences of this process are that it requires time, and a laborious research for the vessels, and that it may expose us to the risk of overlooking some of them which afterwards might give rise to unpleasant consequences: it would be advisable to submit it to an important modification. The threads in fact would not allow of our abandoning the epiploon behind the hernial opening, and would compel us to arrest it in the ring. The torsion of the arteries, which might be readily performed in such cases, would advantageously replace the ligatures and should be substituted for them. I have used it in two instances, and am of opinion that but for this precaution my operation would have been attended with more difficulty.

II. *The ligature*, which was used a long time since, and which had already been mentioned by Galen, was in the last century the object of numerous attacks. J. L. Petit, among others, reproaches it with frightful consequences. A patient in whom he had used it was speedily attacked with colics, violent pains in the abdomen, and nervous symptoms which no one knew how to explain. The surgeon

took off the dressing to see if the intestine had not come out again. Finding nothing of this kind, he removed the ligature, when all the symptoms disappeared, as if by magic. From this fact and some others, it has been concluded that the constriction of the epiploon was almost as formidable as that of the intestine. Theory, which is always ready to be brought in support of opinions which practice has suggested, has appeared to furnish an explanation of the phenomenon, by indicating the fact that the great sympathetic nerve distributes a certain number of branches to the whole extent of the epiploic membrane. Pipelet confined himself to remarking that the dangers arise from the constriction having rolled up into a cord a portion of a membrane which requires to be kept spread out, and the opinion of J. L. Petit has in this manner become an axiom. As the ligature however is infinitely more easy of application, and that it protects us from hemorrhage with greater security than all the other methods, some practitioners have not been disposed to renounce it entirely. Hey and Scarpa, for example, assert that by means of a very simple modification we may avoid its inconveniences without interfering with any of its advantages; the first applies the ligature in the same way that the ancients did, but he recommends that we should tighten it only by degrees, and in such manner as not to bring about the mortification of the organ until after the expiration of several days; the second leaves the epiploic plug in its place until it has become covered with cellular granulations, and then strangulates it in the manner of Hey.

III. *The Author.*—The facts related by these authors in favor of their practice, leave no ambiguity in respect to its innocuousness, and there is no doubt that it should be adopted by preference if the ligature in mass were as much to be dreaded as Petit thinks it is. Fortunately this is not the case. In fifteen cases already, I have had occasion to ligate the epiploon, and most of the patients have got well without any accident. When the tumor to be removed does not exceed the size of the finger, it would appear to me that it might be embraced without danger by means of a strong ligature and effectually strangulated at a short distance from the ring. On the contrary, I divide the root into as many portions as is desirable when it is larger, in order to pass a thread around each of them, and to be enabled to tie them in this manner separately. I found two were sufficient in a woman I operated on in 1829, at St. Antoine. The same was the case in a man operated upon by M. Payen. In a lady whom I operated on with M. Gresely, I was obliged to use seven. We then excise all that portion which is outside of the threads, which latter are to be collected on one or several points of the ring, and the operation is then terminated. M. Goyrand, (*Press. Méd.*, t. I., p. 215.) who has followed this method, has also had every reason to be satisfied with it. In conclusion, if the epiploon is gangrenous, and we wish to return its sound portion into the belly, the best plan is to divide it through the living portion, and then to twist its vessels. If the surgeon, on the contrary, deems it advisable not to push it back beyond the hernial circle, he may confine himself to detaching those portions of it which are completely mortified, and without making use either of the ligature or torsion. When it is simply irreducible, with-

out having lost its vitality, and when we are obliged to excise it and then to leave the remainder in the ring, a ligature which would include the whole of it, or several threads, each of which would embrace a distinct portion, constitute the process which is at once the simplest and the safest to be adopted.

IV. Some practitioners have considered that *after having returned all the viscera into the belly, the sac* which is left in the wound, should in its turn engage our attention. Those who, like Garengeot, recommended that it should be liberated without being opened into, suggested that it should be completely isolated, and then crowded into the interior of the ring, where it was to be kept up by means of a pelote of linen or lint. There are others who have advised to apply a ligature upon its neck to strangulate it, and then excise it. In cases even where it has been deemed proper to divide it throughout its whole length, it was suggested also that it might be reduced and made use of to plug up the hernial passage. Louis earnestly proscribed all such attempts, maintaining that the reduction of the sac is impossible, and that the adhesions upon its external surface do not admit of the mobility (*glissement*) which under such circumstances would be required. On this point, Louis has certainly been deceived. It is exceedingly probable that the sac, whether opened or not, if it were pushed back in this manner, would close up the ring to a sufficient extent in some cases to prevent the return of the disease. Its excision and its ligature would not possess the same advantages, though exposed to the same inconveniences. Should it in fact become necessary, in order to remove it, to have recourse to the cutting instrument, there would be evidently danger in certain cases at least, of wounding vessels or other parts which it is important should be respected. I would therefore recommend the reduction of the sac in all cases where it is found to be almost entirely free, or where its adhesions at least are so trifling that they may be destroyed without the aid of the bistoury, or any other cutting instrument. It has been supposed, moreover, that when once laid open, and we should not wish, or did not find it practicable to attempt its reduction, it might be advantageous to exsect its flaps. I see no objection to a process of this kind, except that it is not applicable to hernias surrounded with large sized arteries and organs of importance. Nevertheless, if the borders of the sac were sufficiently well isolated to enable us to excise them effectually without wounding any important part, the operation could not but be attended with advantages. By this means the wound is more uniform, the suppuration less abundant, and the subsequent treatment of the operation necessarily rendered somewhat more simple.

**Dressing.**—The dressing, after the operation for hernia, is reduced to a trifling affair. A perforated linen spread with cerate is placed over the entire bleeding surface, and over this are immediately applied the small balls of lint. Then come the plumasseaux, and compresses, and finally a bandage, adapted to the kind of hernia for which the operation has been performed. In place of a perforated linen, some persons employ a simple piece of fine linen. By being made larger than the wound, it serves in some respects as a sort of chemise to the lint, and moreover performs the same offices as if it was perforated; but as it offers no egress to the discharges, I see no

reason for giving it the preference. Others confine themselves to filling the whole wound with lint without the interposition of linen, and then to covering it with plumasseaux, compresses, and the containing bandage, as in the preceding case. The principal objection to this practice is, that at the time of the first dressings it renders more difficult the removal of the deep-seated portions.

I. *Immediate Reunion.*—Franco, who appears to have been the first that endeavored to establish as a rule, the necessity of laying open the hernia, and liberating it at its strangulated portion, recommends that we should afterwards approximate the borders of the wound and make use of the suture to maintain them in contact. Most of the surgeons of that epoch appear to have acted in conformity to the advice of Franco. There were none, not even Rousset, Paré, Pigray and Thevenin, who did not adopt it. It had, however, been laid aside until about the middle of the last century, when Mertrud again endeavored to bring it into repute, by maintaining that the wound in an operation of this kind was placed in the same conditions as a simple wound. In spite of the argument of Hoin and Le Blanc, who adduced quite a number of facts in their support, the process ultimately fell into disuse, as it had done in the century in which it had originated. Union by the first intention, however, appears to have been again made trial of by some modern practitioners. M. Serre establishes beyond dispute, that it is in fact possible by means of the suture, to cure in a few days the wound which results from an operation for strangulated hernia. M. H. Bérard also informs me that he has made trial of it at the Hospital of St. Antoine, and that his patient was restored at the expiration of six days. Up to this point, as it appears to me, we are perfectly agreed on this question. If the point under consideration is only that of the possibility of this result, there is no doubt that the practitioner of Montpellier is perfectly right; but the important point to examine is the utility of such a procedure.

II. *Secondary Reunion.*—When the hernia is but of small size and recent, and its envelopes preserve a certain degree of thickness, and almost all their natural characters, and that the sac neither rolls nor leaves fringes or flaps whose mortification at the bottom of the wound might be apprehended; union by the first intention would certainly take place in a large number of cases. When the tumor presents a larger volume, and its coverings are attenuated and the seat of various alterations, and that the sac is large and has a tendency to roll up upon itself after the reduction of the viscera, the chances of success are not as good. It is then to be feared that a suppuration may take place in the midst of the tissues, and separate them by extending itself in various directions, and thus give rise to collections and serious accidents. This is what I have seen in those cases where I had deemed it prudent to attempt immediate reunion. The hernia nevertheless was not very large. The lips of the wound were brought into accurate coaptation, and were maintained at their root by an exact and methodical compression. On the fifth day we thought we could count on agglutination having been accomplished. On the following day, however, we were undeceived. Swelling, redness, pain and heat manifested themselves below one of the sides

of the wound ; the inflammation increased and was accompanied by fever and general symptoms, which were not subdued until after the opening of an abscess of considerable size which had insidiously formed at the lower angle of the sac. This immediate reunion, moreover, appears to me to act in opposition to one of the intentions of the surgeon, which is to favor as much as possible the radical cure of the hernia. Without the necessity of placing the divided tissues into perfect contact, we may with facility approximate them to a certain degree, diminish to a greater or less extent their bleeding surfaces, and thus while favoring suppuration obtain a cure in from 20 to 30 days. A patient treated in this manner had his wound completely closed on the 24th day. A woman whom I operated upon with M. Forget, (*Lancette Franç.*, t. II., p. 354,) was perfectly re-established at the end of a month. After an operation of this description, would a more rapid cure be a matter of such great importance as some persons appear to have imagined ? Finally, therefore, except in a few cases, secondary union is the method which possesses most advantages, and the one which in this operation deserves the preference.

III. *When the patient has been once dressed,* he is recommended to make no effort or movement whatever which can react on the abdominal organs, or that if he is forced to cough or contract his muscles from any cause whatever, he must apply his hand upon the front part of the dressing, in order to support it. Without these precautions the intestine might escape a second time, and reproduce the accidents. Lassus relates the case of a man who, in this state, had the imprudence to leap out of bed and walk some steps. The intestines came out in large quantity, and it was with much difficulty that their reduction could be effected. We must not, however, allow ourselves to be too much alarmed by such apprehensions. When the intestine has been once returned into the belly, it does not very readily come out again. A slight attack of coughing, or the moderate exertions made by the patient in turning himself in bed, would not be sufficient to reproduce the hernia. If, in consequence of the débridement, the orifice of the abdominal wall should be found to have been somewhat larger than usual, the sensitiveness which has already been established in these parts, or that which the inflammation soon occasions here, forms a kind of barrier which the viscera rarely pass. It would appear that a natural instinct prevents their passing in this direction, and that the patient, even when he does not think of it, is, so to speak, compelled, as often as he makes any effort, to prevent this being extended towards the wound. These remarks appear to me to be useful in this respect, that if prudence ought to recommend repose and immobility of the patient who has been operated upon, there would also be an inconvenience in forbidding him to venture to move himself either in one direction or another, or in considering the slightest exertion as dangerous ; they will show, moreover, that there is no necessity of making the bandage compress the front part of the wound, and that a containing dressing methodically applied, will perfectly fulfil the object in view.

D. *Subsequent treatment.*—Unless certain particular accidents should occur, the wound should not be dressed before the third or

fourth day, as it is not until then that the suppuration begins to be established. The dressing is afterwards renewed every morning, and requires no particular directions. Should certain portions of the sac, epiploon, or any other tissue have mortified, they are to be excised immediately. Emollient or chloride lotions, even the decoction of bark when the suppuration becomes fetid or grayish or the tissues continue pale, or the employment of nitrate of silver when the cellular granulations spring up with too much activity, might become necessary; but these different resources are resorted to, under such circumstances, from indications which differ in no respect from those which require them in other kinds of wounds. When everything goes on well the symptoms of strangulation cease almost immediately. Alpine evacuations come on abundantly at the expiration of a few hours, and afford corresponding relief to the patient. The pulse resumes a certain degree of force, and sometimes acquires even so much frequency as to constitute a febrile condition, and it is not until after the expiration of four or five days that this slight reaction ceases. Frequently the functions are not so speedily and completely re-established. The inflammation of the peritoneum may extend in place of being moderated. The peristaltic movement having been disturbed, sometimes experiences difficulty in resuming its ordinary functions, and the matters are not then pushed forward with sufficient force from above downwards to arrive without difficulty into the lower extremity of the alimentary canal. This inaction in the intestines may arise from a slight degree of inflammation having taken place in its several coats in the vicinity of the hernia.

I. *If then the stools do not take place spontaneously* at the expiration of two or three hours, we administer a simple enema. In case this is not sufficient, we soon give another, which is of a somewhat more irritating character. If after twelve hours the evacuations have not yet taken place, we should have to have recourse even to purgative injections, by means of decoction of senna. Many practitioners are in the habit of employing at the same time a slight purgative, administered by the mouth. Dionis, who strongly recommends the advantages of such a course, states that it was recommended to him by Moreau, physician of the Dauphine. Some surgeons, at the head of whom are to be placed Dupuytren and M. Green, nevertheless censure its employment, asserting that it must necessarily promote or aggravate an inflammation, which is already too much to be dreaded in persons affected with strangulated hernia. At first sight this reasoning might deceive us, although in reality it is easily refuted. In fact the matters accumulated in the intestines are a powerful source of inflammation. Now the best means of subduing or preventing this inflammation, is to force these matters to escape by the rectum. In this respect the purgative injections and drinks of the same nature possess an efficacy which no one can call in question. At the hospital of Tours, I have seen M. Gouraud operate in quite a great number of hernias; he administered to all his patients a purgative dose almost immediately after, and no where, as far as I know, was there a large proportion of cures. Boyer, who was in the same practice, was also deemed exceedingly fortunate in this description of operations. As to the nature of the purgative,

this may be of different kinds. Some give one or two ounces of castor oil in teaspoonsful at a time, and others employ Epsom salts. The purgative which I have seen M. Gouraud administer, is composed of an ounce or two of manna dissolved in a glass of infusion of mint. There are those who prefer dissolving this last mentioned substance in four ounces of red wine. The common prejudices are opposed to the use of this vehicle, and I have no personal experience in its favor. The purgative I prefer is castor oil in infusion of mint, with syrup of lemons. I notice with pleasure that this practice, in favor of which M. Tessier has adduced new facts, counts at the present day a number of advocates. It is unnecessary to add, moreover, that in my opinion the administration of a purgative is not indicated, and is at least unnecessary when the stools appear spontaneously, and that there is no evidence of any intestinal disturbance.

II. When instead of a mere obstruction, there are found to be symptoms of *actual inflammation*, or manifestations of peritonitis, notwithstanding the re-establishment of the course of alimentary matters, we should unhesitatingly subject the patient to the most energetic antiphlogistic treatment. One or more bleedings by the arm, one or several applications of leeches to the number of 20, 30, 40, and even 60 if the strength of the patient permits, should be immediately prescribed if, in the space of twenty-four hours, the inflammation should not be reduced, but, on the contrary, have a disposition to extend and become general. Nor can I perceive why the mercurial treatment and *salivation* might not also be advantageous, or what objection there would be in applying every two or three hours friction upon the belly with two or three gros of Neapolitan ointment, together with the administration internally of two grains of calomel every two hours. The cases of puerperal, simple and traumatic peritonitis, which have evidently yielded to this treatment, are a sufficient authority for not omitting it under the present circumstances, when the sanguineous evacuations no longer afford any prospect of success.

III. These unfortunately, however, are not the only difficulties after kelotomy, which may present an obstacle to the re-establishment of the functions. Besides the *return in mass of the intestine*, which continues to be strangulated at the neck of the sac, or which becomes lodged between the parietes of the abdomen, we have to apprehend moreover that the *noose* which was outside, may in entering have passed *above* or below an *abnormal bridle*, which is sometimes found in the neighborhood of hernial openings. It is also possible that the portion which has been reduced, may form an angle, and one so acute as not to allow of the passage of the matters, as is proved by a case of Lassus. The same difficulty may arise from the *intestine* having become *twisted upon itself* in such manner as to close up its passage completely. It may moreover have slipped through a tear in the epiploon, or in some old false membranes, or in the mesentery.

Finally if, after the reduction of the viscera, the vomitings, pain and distress continue at the same time with the constipation, without our being authorized to impute such symptoms to a violent inflammation of the peritoneum or some other viscus, and should there be

no reason to suppose that an infusion of intestinal matter has taken place, we are justified in believing that the strangulation has not ceased, but from having been external has now merely become internal. The first indication then is to reproduce the hernia; we must then make the patient cough and move, and exert himself. In case this does not succeed, the finger is to be introduced through the ring into the abdomen, in order to ascertain the state of things as correctly as possible. Should the surgeon clearly recognize the intestinal noose, and find it tense, fixed or immovable, he will endeavor to seize it with the dressing-forceps in order to bring it to the outside. Should it appear to him that the constriction has been caused by a bridle, ring or any lamella whatever, he should proceed to divide the same by means of the scissors or curved bistoury guided on the finger. If the finger cannot reach the parts, or conveys only confused notions in regard to their arrangement, we should proceed to examine carefully the neighborhood of the wound, in order to ascertain if the organs contained in the belly do not form a projection there, or a sort of tumor which is perceptible through the skin. There can be no doubt that under such circumstances it would be necessary, as a dernier resource, to enlarge the incision at the ring liberally, and to penetrate to the point where the strangulated organs are situated, in such manner as to lay them bare completely, and to be enabled to disentangle them and to give them full liberty to spread out in the abdomen.

### § III.—*Internal Strangulations.*

An internal strangulation co-existing with an external hernia may be very difficult of recognition. A woman 42 years of age, affected with an omphalocele and laboring under symptoms of strangulation, was received in the Hospital of the Faculty, in the month of March, 1824, and would have been submitted to the operation for hernia, had it not been perceived that there was a hard deep-seated tumor, which was situated in her right iliac fossa. This tumor opened itself upon the outside, and was formed by the cæcum, which was filled with a mass of stercoral matter! Another woman 49 years of age, received in the same hospital, in the month of July, 1825, had been vomiting for the space of 24 hours, with the impossibility of obtaining any alvine evacuations. The belly was distended and painful, and the pulse small, hard, somewhat frequent, &c.; at the same time there existed a crural hernia. On opening the dead body I found the commencement of the rectum transformed into a lardaceous tissue, and completely shut up. The hernia had suffered in no respect. In another case, that of a man I operated for strangulated hernia; the accidents continued, and I was on the point of operating for the hernia, which he had on the other side. After death we found that the intestine, which had become twisted upon itself, was situated within the belly in an infundibulum of the epiploon. A patient operated upon in my presence by M. Michon, presented a somewhat similar case. Any polypous, fibrous, or cancerous tumor of the intestine, should it have acquired a certain size, would produce the same accidents. A man who had been a

long time in the Hospital of Tours, for vomitings and a constipation which would yield to nothing, finally died. The small intestine, which was greatly dilated above, was shut up at its middle portion by a cylindrical mass more than a foot long, partly free and in part adherent, and which had been produced by an ancient degenerate invagination. If the hernia which this man had formerly had, had still existed, the accidents noticed during his life might possibly have been attributed to it.

Numerous examples of this kind are found in scientific works. A patient who was sent to me in the month of October, 1831, from the service of M. Andral, presented to me one of the most remarkable examples of this description ; the memoir of Hévin proves, at the same time, that the different descriptions of invagination may produce the same assemblage of symptoms. It may also happen that such accidents arise from a spiral torsion of a noose of the small intestine upon the mesentery, or by its becoming flattened against the spine, as was proved by the death of Chopart ; from a circular contraction on a portion of the organ which has been returned into the belly, after having been for a long time lodged in a hernial opening, as in the case related by Ritsch ; or from the neck of the sac, after it has been returned into the belly with the hernia, continuing to strangulate the intestine, as is seen in the cases of Le Dran, Arnauld, &c. ; and more frequently still from the noose of the intestine becoming entangled to such degree as to be strangulated by passing through certain rents or below certain bridles or appendages of the abdominal organs. M. Bérard has seen it in this manner become lodged in the anterior mediastinum, by detaching the xiphoidian fibres from those of the diaphragm ; and also it has been in many instances seen introduced into one or the other of the thoracic cavities through the body of the diaphragm itself ; through a rent of the epiploon, as has been seen by Arnaud ; of one in the mesentery, as mentioned by Saucerotte and M. Bouking, (*Gaz. Med.*, 1838, p. 109;) through the hiatus of Winslow, and a laceration of the transverse mesocolon, as noticed by M. Blandin ; between the bladder and the pubis, (H. Cloquet, *Bull. de la Fac. de Méd. de Paris*, p. 86,) where an epiploic bridle, adherent to an inguinal sac retained it in a state of strangulation ; under the cæcal appendix, which latter had become adherent at its point, on some one or other portion of the cavity of the abdomen ; under an accidental diverticulum of the intestine ; under an epiploic arcade, connected with the spine on the one hand, and with the upper strait of the pelvis on the other, as has been seen by M. Bonnet ; under an enormous bridle in the form of a T, the horizontal branch of which extended from the liver to the left side, and the vertical portion to the right iliac fossa, as I have noticed in two instances ; finally, under the thousand forms of bridles or cords, that diseases or certain accidents may give rise to the formation of in the interior of the belly. Strangulation produced by these various causes, differing after all from hernial strangulation only in having its seat in the interior of the splanchnic cavities, may consequently readily lead to error in patients who have at the same time a visible rupture externally. It may, nevertheless, in the majority of cases be distinguished by noticing the point from whence

the pains originate and their direction, and by comparing the condition of the tumor with that of the belly, and vice versa. When this strangulation exists separately, there is scarcely any room for deception, but the question then arises to determine its species, and to ascertain if surgical art can afford any relief. If the affection has supervened suddenly, in consequence of an effort made, or any kind of violence; if the patient has been conscious of feeling a laceration, accompanied with a crackling noise, and with a pain, which from one determinate point has extended over the rest of the belly; if from this moment vomiting of alimentary, mucous and afterwards sterco-ral matters, have continued to take place, at the same time that it has been impossible to procure alvine evacuations, and that the ordinary symptoms of a violent peritonitis are wanting, it would be difficult not to believe in the existence of an internal strangulation.

A. *Internal remedies.*—Three classes of remedies have been proposed to relieve accidents of this kind. The ancients, who were fond of believing in the existence of invaginations and the twisting of the alimentary tubes, had great confidence in *quicksilver*, *balls of lead*, purgatives, &c. They hoped by means of such heavy and active substances, to act mechanically on the intestines, and to compel them to disentangle themselves by means of sudden movements. MM. Balluci, Bellini, and Ribell, have also in our days adduced examples in favor of *quicksilver*. In recent and simple volvulus, such means might in some cases be followed by success; a patient who by the advice of M. Vogel, (*Arch. Gén. de Méd.*, t. I., p. 450,) had swallowed quite a large quantity of crude mercury, evacuated twenty-two inches of small intestine, the nature of which was established by M. de Rapp. Forty-three cases of this kind have been collected by M. W. Thompson, (*Encyclog. des Sc. Méd.*, 1839, p. 221;) but there is no person who would not dread their employment in a case of internal strangulation properly so called. For my own part I should not dare to have recourse to them.

B. *Local* and general bleedings, cataplasms and opiates, suitable for moderating the inflammation and assuaging the pain, have no influence whatever on the kind of constriction in which the intestine is implicated. The only advantage they have is that of favoring the efforts of the system, or the process by means of which it has in certain cases been so fortunate as to re-establish the continuity of the intestine without destroying its permeability. The invaginated portion of the intestine may in fact, after a greater or less length of time, and accidents more or less severe, become detached by the rupture of its neck or root, whether it has been attacked by gangrene, or whether this separation takes place by the progress of a simple eliminative ulceration. In such cases the mortified mass, having become free, is ultimately expelled outwardly. The whole of the cæcum, and a large portion of the sigmoid flexure of the colon have been seen to be discharged in this manner, numerous examples of which are contained in the memoir of Hévin. MM. Rigal and Bounial (*Ibid.*) have seen as much as 30 inches of small intestine evacuated by this process. Cases that are nearly similar have been related by MM. Mallet, Baillie, Lobstein, La Coste, Boucher, Gaultier de Claubry, &c.

C. *Gastrotomy.*—It is readily understood, moreover, that a ter-

mimation like this can only take place in cases of invagination, and that for the relief of an actual strangulation we cannot count on the resources of the system. *Gastrotomy* then presents itself as our last refuge. Up to the present time but few persons have ventured to perform it, and experience, so to speak, is silent on this subject. We cannot, in fact, place any confidence in the history of a certain Baroness de Lanti mentioned by Bonet, and who, according to the authority of an ecclesiastic, had been cured of an iliac passion by an incision into the lower belly. Though the case in which Nuck recommended the belly to be opened in order to reach and untie the intestines may be somewhat more authentic, and that M. Fusch (*Arch. Gén. de Méd.*, t. IX., p. 118,) has published a case of radical cure by gastrotomy performed for an invagination, we cannot, nevertheless, but with extreme caution, place reliance upon so small a number of facts. M. Pring, (S. Cooper, *Dict. of Surg.*, 7th edit., p. 311,) desirous of affording relief to a lady whose rectum had become obliterated by scirrhosities, laid open the sigmoid flexure of the colon, established an artificial anus there, and in this manner prolonged the life of the patient six months; but M. Monod, (*Gaz. Méd.*, 1838, p. 667,) having performed gastrotomy in a woman twenty-five years of age for supposed ileus, saw death supervene two days after, and found that in place of an ileus the case was nothing more than a simple coarctation above the cæcum. If it should happen that we had arrived almost to a positive certainty of the existence either of a recent invagination or of a strangulation, and that the locality of the disease was well ascertained, we should, in my opinion, venture to perform gastrotomy, which was already in use at the time of Praxagoras, who united the wound of the belly immediately, by means of the suture. Dupuytren, who made trial of it in one instance, would probably have succeeded, he says, if he had been allowed to incise as he wished upon the side of the belly where the pain was situated, in place of incising on the linea alba as he did, in conformity to the advice of the consulting surgeons. A case noticed at the hospital of St. Antoine, and the facts which I have since collected at La Charité, prove also that it is in some cases possible to designate, with sufficient precision during life, the actual seat of the strangulation. The patient should be laid upon his back, in the same way as for the operation of ordinary hernia. The incision, which should be rather semi-lunar than straight, should be made very near the strangulation. If we are not sure of the seat of this last, the incision should be made outside of the recti muscles. We should then seek for the diseased part by means of the fingers. In case of invagination we should, in order to remove it, only have to make traction upon the two ends of the intestine in an inverse direction, and then immediately replace the whole in the peritoneal cavity. If it were a strangulation the finger might undoubtedly succeed in reaching and isolating it, in such manner as to divide the constricting band or circle without danger by means of a bistoury. A female patient who was sent to me by M. Donné, and who died at the Clinique, might possibly have been operated upon in this manner.

D. *After the taxis.*—Another kind of internal strangulation, viz.: that which persists after the forced reduction of a hernia, also

requires to be mentioned. M. Delmas mentions a case in which the organs had become lodged in this manner in the tissues of the muscles themselves. They may also pass under a bridle or through a rent, in the same manner as when we wish to reduce them after having opened the sac, and as I have mentioned further back. It is unfortunately a thing too common to see these reductions in mass under the influence of the taxis, incapable of preventing the accidents from marching progressively forward. There are few authors who have not mentioned instances of this kind, and we still daily meet with them in practice. The first thing to be done is to make the hernia protrude again. If nothing should present itself at the ring, the surgeon would be censurable if he delayed too long a time and did not perform the operation immediately. He knows that a hernial tumor existed; that after having given rise to accidents or remained a long time outside, it has disappeared under the influence of extraneous efforts; the opening which had given a passage to it is free, readily admits the extremity of the finger, quite frequently even exhibits a kind of depression or cul de sac, or seems to be drawn towards the interior by some bridle or some adherent membrane; and sometimes also the finger directed into this depression is enabled to feel an intestinal tumor which has been imperfectly reduced. In a case like this we incise the soft parts in the same way as for strangulated hernia, and we arrive by degrees into its interior. If the sac may be reached, it rarely happens that the operator is not enabled to come down upon the seat of the disease. Dupuytren, who had been frequently called upon to relieve this species of strangulation, and who had seen a great number of these cases at the Hotel Dieu, makes the remark that after having in vain endeavored to bring the viscera to the exterior, we have the resource still left of largely incising the ring in the direction in which there are no vessels, and of arriving by this means into the belly.

### § VII.—*Hernia with Gangrene.*

A. *When the tumor is entire.*—When the gangrene of a hernia is recognized at first view, the division of the tissues does not require the same precautions as in the ordinary operation. The incisions may in fact penetrate, without any impropriety, into the intestine with the first cut. If the gangrene comprises the whole tumor, and the hernia be of large size, we should, after having made several deep incisions, remove all its mortified portions. We might nevertheless confine ourselves to the incision of the intestinal noose and wait for the sloughing of the tissues. Quite a number of facts show that the system, under such circumstances, readily succeeds in effecting a complete cure. J. L. Petit, travelling on one occasion by post in Germany, stopped at an inn, and was immediately struck by an odor of gangrene. They showed him, in a neighboring room, a man who was suffering with symptoms of hernia with mortification. Supposing the man would die he merely made some incisions into the tumor, which immediately discharged an abundant quantity of matters. Upon his return, twenty-eight days after, J. L. Petit learned, not without astonishment, that his patient had recovered perfectly, and

was cured without a *stercoral fistula*. Having gone on another occasion to Ferté-sous-Jouarre and lost his way in the night, he asked the road at a house where he perceived a light. The woman told him her husband was at the point of death, and entreated him to come in. This also was a strangulated hernia, which J. L. Petit confined himself to opening and cleansing, recommending not to adopt any other measures, as he considered that this patient also would not survive. The cure however did take place, and it was the individual himself who came to inform the surgeon of it some time after.

B. *When the tumor is opened.*—Nevertheless we cannot dispute that it is better to liberate the tumor, by means of the scissors or bistoury, of everything it may contain that is evidently mortified. In other respects there is no reason why we should proceed otherwise than if the intestine alone was gangrenous, and that we did not recognize the gangrene until after the opening of the sac. In this last case the gangrene may occupy only the most projecting part of the strangulated noose, as it may have its seat in the interior of the ring itself and upon the parts which are directly acted upon by the constriction.

I. *To open largely into the intestine.*—Many methods have been recommended in the event of this accident. One of the most ancient consists in opening largely into the intestine in order to make a free passage for the matters. In proceeding in this manner, we have two things to apprehend: 1st, that the constriction may persist to such degree as to present difficulties to the passage of the substances contained in the alimentary tube; 2d, that we almost unavoidably establish an artificial anus. To these objections some persons have replied, that the lower portion of the intestine from no longer receiving any matters, shrinks; that the portion which corresponds to the stomach being the one which alone continues to receive the digestive substances, ought to be sufficiently large in the hernial opening to fulfill in that part without danger the functions of an abnormal anus. On the other hand, experience demonstrates that this mode of procedure has frequently been followed in quite a short time by a radical cure. The two examples just cited are an evidence of it, and J. L. Petit relates others which are no less remarkable. This surgeon being on his way to Flanders, was sent for on the road at Douay, in order to give his opinion respecting a hernial tumor which he could not reduce and which was strangulated. A charlatan, whose opinion had been concurred in by the relations of the patient, maintained that this tumor was an abscess and that it was necessary to open it. J. L. Petit informed them that this might be followed by serious accidents, and that there would at least result from it a *stercoral fistula*. Upon his return he was informed that the patient had been perfectly restored. He furthermore learned that the charlatan opened in this manner all strangulated hernias, and that in the environs of Douai and Cambrai he had thus operated upon a great number of persons. A student of medicine declared to me that his father, who was a surgeon in one of the provinces, had been led from experience to adopt a similar method, and that he had already employed it ten or twelve times with success, whether the strangulated hernia was or was not accompanied with gangrene. When we recollect that *cases of artificial anus which have existed a long*

*time have ultimately disappeared spontaneously*, though the two ends of the intestine had become adherent to and consolidated in the ring, and that a considerable portion of the gut had been removed, such results as those above must soon lose their marvellous character. The resiliency (ressort) of the mesentery and the natural movements of the organs contained in the belly, must necessarily constantly tend to draw towards them the portion of gut which has escaped into the hernia. Little by little the two ends of the intestine succeed in reaching the posterior surface of the ring and in approximating to each other; their openings ultimately become united and the matters pass into the lower portion of the gut in place of escaping by the wound, which latter moreover as it contracts, presents to them a greater and greater degree of resistance.

II. *To divide the ring.*—All authors however do not concur in this mode of considering the subject. Scarpa recommends that after having opened the intestine, if there should be much strangulation we should divide the ring. Without this precaution the matters accumulated behind it would experience, he says, too much difficulty in escaping, and would give rise to a dangerous inflammation even in supposing that they did not keep up the symptoms of strangulation. What danger would there be after all, in proceeding in this manner? The adhesions which he admits upon the limits of the gangrene must give entire confidence. Even though we should be obliged to incise the intestine from within outwards, at the same time with the neck of the sac and the fibrous ring which surrounds it, we should not, according to him, have any reason to apprehend an effusion into the peritoneal cavity. Dupuytren, who has taken ground against this doctrine, maintains, when the gangrene has reached into the ring, that the borders of the hernial opening are usually mortified, and that after the intestine has been once laid open the strangulation must soon disappear of itself, and consequently render all kinds of debridement unnecessary. He thinks, moreover, that the adhesions mentioned by Scarpa are far from being constant around the whole circumference of the intestine, and that if the incision of the alimentary tube was extended to behind the ring, they would not present a sufficient obstacle to the effusion of the matters.

It is certainly incorrect to say that gangrene is never developed without being preceded by adhesions between the neighboring serous surfaces. The opening of the dead body in individuals who have died in consequence of strangulated hernia, has satisfied me that Scarpa had singularly exaggerated the importance of this morbid condition, and that he was deceived as to its frequency and the rapidity with which these adhesions are developed. That these adhesions, in fine, are sometimes restricted to such narrow limits, that it would be difficult not to go beyond them in dividing the hernial stricture through the intestine. On the other hand, it appears to me that the mortification of the neck of the sac, and of the borders of the ring, is much less common than MM. Corbin and Caillard represent Dupuytren to have stated it, and that if we had to count upon this in order to put a termination to the strangulation, we should have frequent cause to regret it. For example, it does not take place when it is the free portion of the hernia which is morti-

fied. I will add, that if we do not divide the stricture, the intestine which is inflamed behind the portion destroyed, usually becomes the seat of considerable tumefaction, which reaches its three tunics, and especially its mucous lining; and that this tumefaction, arrested outside by the constricting circle, extends almost exclusively upon the inner side, in such manner as to produce in some instances almost an entire obliteration of the intestinal opening. This is a result which I saw take place in a woman operated upon for a hernia with gangrene at the hospital of Perfectionnement, in 1824, and who died on the following day. The same result also has happened several times in other hospitals of Paris. In conclusion, if, after having opened the intestine, the matters which it contains either in the hernia or in the belly, freely escape, and if the constriction of the ring is inconsiderable, we may dispense with dividing it. If, on the contrary, the finger inserted into the strangulated portion penetrates and passes through it with difficulty, prudence, in my opinion, suggests that an opening of this description should be enlarged. If the instrument can be readily glided between the viscera and the sac without exposing to the risk of destroying the adhesions which might possibly exist behind, the debridement is to be performed as in the usual operation. If a contrary state of things exists, the bistoury is to be directed into the interior of the intestine itself, to incise from the centre to the circumference, and in one or more directions, the orifice through which the matters are to pass. In reflecting upon the natural arrangement of the parts, it will be seen moreover that the incisions in such cases incur less risk than would be supposed, of producing an infusion into the peritoneal cavity. This effusion would not in fact have to be dreaded, unless the incision was carried beyond the posterior orifice of the ring, and consequently beyond the place where the strangulation is situated, the constriction under such circumstances being almost constantly somewhat nearer to the external aponeurosis than to the *fascia propria*, or the peritoneum. This fact perhaps might reconcile the ideas of Dupuytren with the practice of Scarpa. If we have not divided the stricture; if at the expiration of a few hours the colics still continue; and if in removing the dressing we perceive that the matters escape with difficulty, it is in our power, moreover, to introduce into the upper end of the intestine a female catheter, a silver canula, or what is better still, a large gum elastic tube, and thus procure immediate relief from this difficulty; but if in spite of this the engorgement of the tissues and the narrowness of the ring present impediments to the re-establishment of the functions, we must divide the stricture, as we might have done at the moment of the operation. Since this part of the work was printed, in 1832, I have frequently, from many practitioners having carried the prolonged taxis to an abuse, had occasion to treat in this manner hernias accompanied with gangrene, and it is now a practice which I have definitively adopted.

#### § VIII.—*Hernias with Perforation of the Intestine.*

Up to this point we have supposed that the parts were left in their place; but a great number of practitioners consider that we should,

in order to satisfy ourselves of the extent of the gangrene, cause a certain portion of the intestine which was not contained in the hernia, to be brought through the ring and drawn to the outside; they recommend also that we should then excise every portion of it which is mortified, by dividing through the living part; that we should reduce the sound parts in such manner as to leave nothing more in the wound than the opening or the openings which have been made, or that we should immediately endeavor to unite the two ends of the intestinal noose by means of the suture; from hence arises many operations applicable to perforations which are caused by gangrene, as well as to those which result from ulcers, wounds, &c.

A. *Process of Littre.*—After gangrene Littre proposed to tie the inferior end of the intestine, in order to effect its obliteration, then to attach its upper end into the ring in order to establish, in this manner, an artificial anus, which the patient was to retain the rest of his life. Louis, who was disposed to adopt the advice of Littre, finds it, however, attended with a difficulty, viz., to know how to distinguish the upper from the lower portion of the alimentary tube, to avoid which he recommends that we should administer to the patient a small quantity of syrup of chicory, which, being evacuated at the expiration of a few hours, indicates by its green color in which direction lies the stomach and in which the rectum. This is an ingenious suggestion, but we are rarely obliged to have recourse to it. After the division of the intestine its inferior end almost always becomes contracted, and in a short time reduced to the size of a large cord; while the other usually preserves its primitive dimensions, and moreover, continues to give egress to the matters. As the process of Littre has the effect of establishing a disgusting infirmity, it has necessarily been proscribed, and at the present day is not worthy of the slightest attention.

B. *Lapeyronie* has proposed one which is more simple and more rational. This surgeon passes behind the division a double thread through a fold of the mesentery, and after having pushed back the two ends of the intestine into the ring, makes use of this thread to prevent their entering the belly completely, by attaching it at the outside upon the dressing by any mode whatever. We obtain by this means, it is true, an artificial anus, but one which may possibly close up spontaneously, or by the aid of art. Scarpa, who censures the process of Lapeyronie, recommends, after we have once removed the gangrenous portions, that we should leave the two ends of the intestine in the wound. The adhesions they have contracted during the time the mortification has been going on, are always sufficient, he says, to prevent them returning too speedily into the belly, and to constitute a certain obstacle to any kind of effusion into the peritoneal cavity. According to him the thread through the mesentery would be injurious in more respects than one; in the first place, by presenting an impediment to the gradual retraction of the parts, and to the formation of the *membranous funnel*; secondly, because this thread, which must soon cut through the mesentery, may, at the same time, divide certain vessels whose hemorrhage would be a source of apprehension; and in the last place, because this thread, from resting against the deep-seated surface of the intestines, may

possibly cause there an ulceration or perforation, in the same manner as a precautionary ligature may divide the artery around which it has been placed. As the apprehensions of Scarpa, however, have not been concurred in by all surgeons, there are some who have imitated Layperonie, and who allege that they have had no reason to be dissatisfied with it. M. Hervez de Chégoine, (*Revue Med.*, 1829, t. III., p. 517.) among others, published, in 1829, a case of cure in support of this process. There would be no difficulty, moreover, in leaving the thread for the space only of one or two days, if we really had any apprehension about its presence; we would have nothing more to do than to keep the two halves apart by attaching them separately to the outside, and after the expiration of a certain time nothing would be more easy than to remove the thread by drawing upon it on one of its extremities.

C. *Suture*.—In following the course which has been traced out, the immediate result produced would be a stercoral fistula or artificial anus. The suture has been proposed with a view of preventing this infirmity, and to re-establish immediately the continuity of the divided tube. This is an indication which numerous authors have endeavored to effect by various means, which M. Steinmetz (*Bull. de Fér.*, t. XVII., p. 395,) asserts he has employed in two instances with success, and which, after having been frequently forgotten, has again strongly attracted attention in these latter times.

I. *Suture upon a foreign body*.—The first idea of approximating the two ends of the intestines, and of sewing them together, is attributed to the four masters who united themselves together for common purposes of charity in relieving the sick poor of Paris.

a. *The four masters*.—These surgeons commenced, it is said, by procuring the *windpipe of an animal*. Introducing one extremity of this tube into the upper end of the divided gut, they inserted the other into the lower end, and then approximated the ends of the two bleeding circles, in order to adjust them and keep them in contact by means of several points of suture. Guy de Salicet, who lived before the time of G. de Chauliac, does not make mention of the animal trachea; but he was acquainted with the process of the four masters, and openly censures it. "Do not listen," says he, "to those who tell you before sewing up gut, that we must place inside of it a canula of *sambouc wood* (*sambuc.*) or something else, and then sew up the wounded gut upon this, for," &c. And further on: "It would be much better to use a *portion of gut* from any animal, . . . but we must use neither this or anything else." Is it, however, quite certain that the ancients on this subject entertained opinions similar to those held at the present day? Guillaume mentions it only for incomplete divisions of the intestinal tube, and expressly states that the others are necessarily mortal.

b. There is nothing moreover to show that Guy entertained a different opinion. "And if there should be necessity of a suture (of the parts contained in the belly,) and that it would be advantageous in the manner that it is at the bottom of the belly, and in the large guts, they may be sewed together by the glover's suture. Some persons, like Rogier, Garnier and Théodore, place in the gut a *canula of elder*, in order to prevent the cleft from mortifying the suture, others, as Guillaume has mentioned, introduce there a *portion of the gut* of

some beast, or a portion of the trachea, as the four masters do." The above are Guy's own words.

c. Watson has since recommended *a canula of fish glue*. Some, with Scarpa, make mention of a cylinder of tallow. Sabatier, Ritch, Desault, and Chopart, speak of a piece of *playing card* besmeared with essence of turpentine, or oil of St. Johnswort, or varnished in any manner whatever.

d. The process of the ancients, however, had attracted so little attention, that *Duverger*, who revived it at the beginning of the last century, considered himself its author. It would not appear, moreover, that it had been frequently made trial of, or that up to the present time it has obtained more than two or three cures. Should it be decided upon to make trial of it, it would be, I suppose, a matter of indifference almost whether we used a very pliant portion of the trachea of an animal, a cylinder of glue, playing card, or paper, or a canula of gum-elastic. After having besmeared with some oily varnish this species of tube or ring, which necessarily should be somewhat less in size than the intestine, we should pass through its middle portion three or four nooses of thread or silk at a few lines' distance from each other, armed at each extremity with a needle, and destined to form as many points of suture. Its introduction into the upper end of the alimentary canal can be attended with very little difficulty; but in order to introduce it into the lower end, this latter should be seized with two forceps, which can make traction upon it in an opposite direction in order to enlarge its opening. This being effected, the extremities of each thread are to be passed in succession from within outwards through the corresponding end of the intestine, and at the distance of two or three lines from the wound. After having knotted and divided them very near the knot, the whole is to be returned into the belly; a slight aperient is to be administered, and the patient treated as after the ordinary operation for strangulated hernia.

e. While the reunion is being accomplished, the threads cut through the tissues which they embrace, and as soon as this process is effected; the foreign body, now become free, descends with the intestinal matters, and is soon expelled. In place of four threads, Duverger recommends two only, one in front, the other behind. Those of Ritch, as they were composed of one string, had the inconvenience of forming a kind of septum in the interior of the card. Desault had no other design than that of getting rid of this difficulty when he proposed the modification which is imputed to him, and which is not of sufficient importance to be described in detail. A suture of this description is in the first place very difficult to accomplish; afterwards we should have reason to fear that the reunion would not be effected in the interval between the points of suture; that the threads in becoming liberated, might leave ulcerations, and allow the effusion of some of the fluids. Finally, its dangers are so formidable that unless there had been conclusive experiments and numerous facts, which science does not at the present day possess, we should not decide on having recourse to it, but in despair of any other means.

II. *Suture with invagination.*—a. *Randhor.*—Randhor having under treatment a soldier in whom the continuity of the intestinal tube had been destroyed, proposed to introduce the upper

into the lower end, to attach them together in this position by means of two points of suture, then to reduce them and leave them in the belly. His patient recovered perfectly. As he died some years after of another affection, Randhor being thus enabled to examine the condition of the parts, removed the portion which had been formerly divided, and sent it to Moebius, who took occasion to show it to Heister, which latter, upon the strength of this, made experiments of the same operation upon dogs, but without success. The method of Randhor, which has been eulogized by some, rejected as impossible or dangerous by others, admitted as very ingenious by Louis, and made trial of in a great number of instances since it has been known, does not appear to have succeeded but in a very small number of cases. Boyer performed it in one instance and his patient died. In another case he was not enabled to complete the operation. I have seen it attempted at the hospital of St. Louis, in a patient, who also died on the following day. M. Lavielle (*Journ. Gén. de Méd.*, t. XLV., p. 176,) and MM. Chemery-Havé, Schmidt and some others have, however, each related an instance of cure in its favor. The first difficulty is to overcome the contraction of the lower end of the intestine. One of the best means to effect this, would be to seize at the same time its two principal diameters at their four extremities, with the same number of forceps or hooks. In order to prevent the upper end from filling up or becoming swollen, the assistant would have nothing more to do than to grasp it at the distance of four or five inches from the division, and to hold it properly compressed, while the surgeon is endeavoring to draw it and adjust it into the opening of the rectal portion. But there is another obstacle which M. Richerand, I believe, was the first to point out in a clear and unequivocal manner. The researches of Bichat have shown that mucous membranes do not contract adhesions with each other; and that adhesive inflammation does not usually take place except between cellular surfaces. Now, in the invagination, after the manner of Randhor, it is the peritoneal covering of the upper end of the intestine, which is placed in contact with the mucous membrane of the other. If the law established by Bichat is true, and the remark of M. Richerand well founded, the agglutination of the two ends of the intestine by this method would be impossible. Therefore it had been almost entirely proscribed when M. Raybard (*Mém. sur les Anus Artific.*, 1827,) undertook to bring it again into repute, and to show that it is preferable to the one which it has recently been proposed to substitute in its place.

*b. Process of M. Raybard.*—In support of his assertions, this surgeon relates a number of his experiments upon living animals and facts in pathological anatomy collected on man. M. Raybard, like Randhor, recommends that we should first incise the mesentery in a direction parallel to the concavity of the intestine, and to the extent of a few lines. Afterwards he passes a little above the wound a thread, one end of which remains within the canal, while the other hangs outside. According to him, two nooses thus adjusted will be found sufficient, that is, one on each extremity of the antero-posterior diameter of the diseased gut. By the aid also of a needle, we are

enabled to pass the inner extremity of each thread from within outwards, and through the lower end of the intestine, in order to invaginate the two portions methodically, and to terminate, by fastening each point of suture by means of a knot. M. Raybard maintains that his process is at once more certain, more easy, and infinitely less dangerous than that which has been proposed by M. Jobert; I have not, however, learned that it has yet been applied to man.

*III. Suture with contact of serous surfaces.*—Experiments which were already ancient, might have been adduced in support of the ideas of M. Richerand. MM. Schmidt, Thompson, and Travers, had remarked the singular phenomenon, viz. that if we apply a thread around a small perforation of the intestine, it soon sinks into it as into a depression, in such manner as to be approximated gradually to the interior of the canal, and to become entirely free there, at the same time that the serous membrane or surface is approximated posteriorly, and blended with a layer of plastic lymph as if intended to fill up the opening which but for that would have been left. Still more, M. Travers has found that if we strangulate the entire calibre of the alimentary canal, the peritoneum of the upper portion adheres so rapidly to that of the lower, that the septum formed by this strangulation soon becomes gangrenous, and is detached and drawn in the direction of the rectum in such manner that the tube ultimately becomes perfectly re-established. In France the labors of Dupuytren on the subject of artificial anus, had also already corroborated the same facts, and shown with what facility and promptitude two portions of the external surface of the intestine will agglutinate when they are kept in contact.

*a. Process of M. Jobert.*—From these various facts M. Jobert constructed a method which appeared at first to promise important results. This surgeon commences by turning in the orifice of the lower end of the intestine; he then employs the suture in the manner of Randhor, and by this mode succeeds in bringing the two ends of the intestine into contact upon their serous surface only. Two threads were found by him to be sufficient; he does not knot them, but attaches them outside, in order to remove them after the expiration of a few days. In his experiments made upon cats and dogs he has, he says, succeeded perfectly. But this mode of invagination, which would not appear to be attended with much less difficulty than that of Randhor, presents, at first sight, the advantage only of placing in contact two portions of the peritoneum, instead of applying the peritoneum upon a mucous membrane, as in the ancient process. It has not yet, moreover, been made trial of upon living man.

*b. Process of M. Denans.*—M. Denans, a surgeon of Marseilles, proposed about the same time another mode of invagination. For this purpose he required three small hollow metallic cylinders. He placed one in each end of the intestine, which latter he turned or invaginated within them. The third cylinder, which was somewhat smaller than the two others, was to be introduced into the one above and then into that below, in such manner as to act as a rod, axis or support to both. A noose of thread embraces them and secures all the three on two different points of the intestinal circle. The ends of the suture are divided very near the peritoneum, and the whole

returned and left in the belly. The agglutination of the parts is soon accomplished. Everything which is pressed between the three cylinders soon becomes gangrenous and is detached, and these foreign bodies have then only to descend and pass out with the evacuations. M. P. Guersent has corroborated the assertions of M. Denans by exhibiting an intestinal noose, the ends of which had been brought into contact by the process with the cylinders, and had perfectly cicatrized. M. Denans, (*Note à l'Acad. de Méd.*, 1838,) by simplifying his process still more, uses only at the present day the three cylinders, which incase themselves so accurately that he does not find it necessary to make use of the suture.

c. *Process of M. Lembert.*—M. Lembert in 1825 proposed another mode of bringing the serous surfaces into contact. He passes with an ordinary needle as many nooses of thread as he wishes to make points of suture, first through the thickness of the walls of the upper end of the intestine and afterwards through those of the lower end. The point of this needle is introduced upon the external surface of the gut at the distance of two or three lines from the wound ; he causes it to make its way through the tissues as far down as to the mucous membrane ; brings it out at one or two lines' distance from its place of entrance, and succeeds in this manner in adjusting his noose of thread ; applies his needle with the same precautions upon the external surface and into the tissue of the rectal end of the intestine ; introduces successively and in the same manner the number of threads which he judges advisable, and afterwards has nothing further to do than to knot them in order to complete the suture. In making traction upon nooses of this kind we compel the lips of the wound to become reversed upon their internal surface, to form a valve or projecting border in the interior, and to produce at the same time an exact approximation and direct contact of the outer surface of the two ends of the intestines whose continuity we wish to re-establish.

d. These three processes have the same object in view, viz : that of the *adossement* of the two serous surfaces. That of M. Denans appears to promise more certainty and to be attended with less danger than the two others, in this respect, that it cannot be disarranged. Who, however, would venture to leave the intestine in this manner in the belly ? Who will guarantee that these metallic tubes will not perforate the intestine ? In operating after the manner of M. Jobert we incur the risk of the threads becoming relaxed, and some points in the circumference of the intestine may continue ununited and allow of an effusion. The modification of M. Lembert is apparently more simple and easy ; it does not require either the previous inversion nor the invagination, but it appears to incur to a still greater degree than the preceding, the risk of leaving between the points of suture some interval through which the matters might possibly escape.

e. *The Author.*—If however I was disposed to make use of it, I should prefer employing the whip suture ; that is to say, that I would pass the needle obliquely from above downwards, from the upper end to the outer surface of the lower end ; return afterwards above to the first end at a line or two from the point where I left it, then come back on the second and return again to the first, and so on in

succession until I had passed around the whole circumference of the intestine. To complete the operation there would be nothing more to do than to make traction in an inverse direction upon the two ends of the thread, one of which would be at the origin and the other at the termination of the suture. If these simple tractions would not suffice to cause the reversion of the lips of the wound and to bring the peritoneum in contact with itself, the extremity of a sound would effect this purpose. After making a double knot the operation would be immediately completed. The two extremities of the thread, or either one of them moreover, would serve for attaching the intestine behind the ring, upon the supposition that we did not wish to return it into the belly; and no knot in that case would be required.

*f. Upon a rigid examination*, would prudence authorize us in depending upon such resources, which would necessarily result in death if they failed in effecting their object? Would we be justifiable in exposing in this manner the life of a patient, when by establishing an artificial anus we are almost certain of being enabled to effect a cure at a later period? I have used upon dogs the process of M. Jobert and that of M. Lembert, modified in the manner I have just described. Whether it be that I did not take all the precautions necessary, or that I did not possess all the experience required in such experiments, I am compelled to confess that in two cases out of six the matters were effused into the peritoneal cavity, causing thereby the death of the animals. I will also add that in the four others two only were perfectly cured, while in the third and fourth there remained an aperture through which mucosities made their escape, and around which there were no adhesions or false membranes, which cases would not have been very encouraging for the result. I was also desirous of repeating the experiments of M. Travers, and the result was that in two dogs, which were the only instances in which I made trial of this process, the strangulated intestine was ruptured, and was found completely divided after the death of the animal, which took place on the next day but one.

*g. M. Choisy*, (*Thèse*, No. 322, Paris, 1837,) making trial of the trachea of an animal, after having introduced it into the upper end and attached it there by means of a whip suture, brought the thread from within outwards through the lower end, which he brought up by this means before strangulating it circularly, upon the tube introduced. Though these experiments of the author may have succeeded upon animals, they do not appear to be in my opinion sufficiently conclusive to justify the application of his process, which has moreover been still farther modified by MM. A. Thomson, Amussat and Philippe, upon living man.

*h. Priority.*—There still remains another question to be decided, which is that of priority. M. Jobert (*Arch. Gén. de Méd.*, t. IV., p. 73 or 71) has claimed this honor; but M. Faure (*Arch. Gén. de Méd.*, &c., t. X., p. 474) alleges that when he was a pupil of the Hospital of St. Louis, he had proposed before the year 1820, the adossement of serous surfaces in intestinal wounds. M. Denans (*Ibid.*, t. XII., p. 618; *Soc. Méd. de Marseilles*, 1826; *Journ. des Prog.*, t. III., p. 250; *Bull. de Fér.*, t. X., p. 90) also mentions that the suggestion of his process is disconnected with the researches of M. Jobert, and M.

Lembert, (*Ibid.*, t. X., p. 318; *Bull. de Fév.*, t. IX., p. 325,) on his side maintains that he published his in the year 1825. To determine who is completely right or entirely in the wrong in the midst of all these pretensions, would doubtless be a difficult matter. The following is what appears to me to be probable.

M. Denans began his experiments in 1823, but they were not announced until March, 1824, and the *Archives* for January of the same year, contain a description of the process of M. Jobert. The idea of placing the peritoneum in contact with itself in order to bring about the reunion of intestinal wounds is derived from the labors of Bichat, the assertions of M. Richerand, the observations of Dupuytren, and the experiments which were made at the same time in England and in America. M. Jobert, transforming this suggestion into a principle, has, like M. Denans, a little sooner or a little later, or at the same time with M. Denans, invented a peculiar process to test its application. Setting out also from this point, M. Lembert, who did not communicate his memoir to the Academy until 1825, has proposed another mode of effecting the same object, and this is the one that M. J. Cloquet appears to have made trial of a short time after, upon the man in whom he had the misfortune to cut into the intestine while operating for a strangulated hernia. Such, if I am not deceived, is a true statement of the case.

i. *Appreciation.*—The important point to be ascertained at the present time would be, to what extent it should be retained in practice. In my view the most rational process is that of M. Lembert, and this is the one to which we must necessarily ultimately give the preference, should experience ever confirm the theoretical principles which have suggested it. M. Dieffenbach, (*Arch. Gén. de Méd.*, 3<sup>e</sup> série, t. I., p. 314,) who operated by this process, after having excised a gangrened noose of the intestine, supposed that he had succeeded, but the patient died at the expiration of a few weeks. Two points of the suture were still suppurating. We must moreover not forget that pure and simple invagination, in the manner proposed by Randhor or as modified by M. Raybard, has to be submitted to new experiments upon living animals, before being definitively proscribed or yielding its place to the process either of M. Jobert, M. Denans or M. Lembert.

D. If the mortification were limited to the peritoneal tunic, or had not reached the mucous membrane, we might, as Desault recommends, effect the reduction of the parts and await the result from the resources of the organism. But of two things one must happen: either the gangrene is evident, and in this case the surgeon not having the means of ascertaining with certainty whether it will extend or not throughout the whole thickness of the intestinal parietes, cannot venture upon attempting reduction; or its existence is questionable, and in that case prudence suggests that the intestine should be returned into the belly. If the gangrene occupies only a small space we must remove the portion of the intestine which is the seat of it, by incising upon the living part in such manner as to make an elliptical wound lengthwise or transversely, according as the same shall present a greater or less facility of being brought into harmony either with one or the other of these two directions. On the contrary, should

it extend over a large portion of the periphery of the intestine, it would be better to remove an entire segment of this cylinder, in order to make trial of one of the operative processes mentioned above. When the gangrenous portions have been once removed, the solution of continuity is reduced to the condition of a simple wound and is to be treated like that.

E. *Wounds of the intestines.*—Modern labors have demonstrated that the *perforation of an intestine* by a pointed or cutting instrument, may be left without danger in the abdomen, provided it has less than two or three lines of diameter. The muscular fibres soon pucker up its edges, in such manner as to compel the mucous membrane to become entangled in it, so as to close it up. Nor does an incision of somewhat greater extent, as one of three or four lines for example, always give rise to an effusion; its borders sometimes become agglutinated to the corresponding surface of another intestinal convolution, or it may come in contact with a fold of the epiploon, which frequently becomes lodged in it, and closes it up in the manner of a plug. I have in two instances reduced an intestine, perforated in this manner, without any unpleasant consequences resulting. M. Vidal has communicated to me a similar fact, and these results are calculated to diminish to a great degree the importance of sutures, and of the operative processes above mentioned. I shall recur to them again in treating of artificial anus. It would, nevertheless, be imprudent, when such lesions are exposed to view, to abandon them to the efforts of nature. Though it be true that the great majority of them will succeed in healing up without producing any accidents, it is also very probable that others might be attended with a fatal effusion.

I. In *hernias*, these wounds present themselves under two distinct forms; 1st, in the condition of a *simple division*, when they have been made by the cutting instruments used by the operator; 2nd, under the *aspect of an ulcer*, or solution with a loss of substance, where the constriction of the ring has been the cause. In this last case we can scarcely hope that they will close up without assistance, and should we decide upon treating them by the suture, it would be advisable that their borders should be previously regularized. We have here the choice of the glover's, the noose, and the interrupted suture. The glover's suture has the advantage of being prompt and easy, and of closing up the wound accurately; only that it is difficult to withdraw the thread when we suppose the reunion to have been accomplished. The noose suture, or that of Le Dran, besides being less prompt, possesses the disadvantage of puckering up and contracting the intestine, in consequence of the breadth of the wound; but the threads having been passed only once through the tissues are easily removed and withdrawn through the opening in the abdominal walls. This suture, slightly modified by M. Jobert, (*Bull. de l'Acad. Roy. de Méd.*, t. I., p. 332,) who had opened into the intestine, while operating for a crural hernia, succeeded perfectly; but death was the result of it in two other cases which were published by M. Fleury, (*Arch. Gén. de Méd.*, 3e sér., t. I., p. 297.) The interrupted suture possesses nearly the same advantages as the glover's, and if it should be modified as was proposed by Beclard, there will

be less risk when removing it, of lacerating the adhesions and the forming cicatrix, than there would be with the simple whip suture. It is nevertheless the spiroidal suture, combined with the principles of M. Lembert, which would appear to deserve the preference over all. Whether the wound be longitudinal or transverse, the operation, notwithstanding, is to be performed after the same rules. When the adossement is completed, we may proceed in two different manners. First, by *knotting the suture* and dividing it close to the intestine, then reducing this last, and leaving the suture free in the cavity of the abdomen; or second, we may *retain the thread* on the contrary, and attach it to the dressing outside, in order to prevent the wounded organ from escaping to any distance, and to compel it to attract adhesions behind the ring. If it were certain, as is averred, that ligatures inserted into the tissues of the intestinal coats, would always fall into the interior of the canal, the first method ought evidently to be preferred, since the other must necessarily present more or less obstruction to the progress of the matters; but the majority of surgeons have not yet adopted this mode of proceeding. The two cases of M. Cloquet and M. Liégard, both of whom followed the process of M. Lembert, are in fact the only instances, which up to the present time can be cited in its favor.

II. *M. Raybard* even considers, under such circumstances, that the principal intention of enteroraphy is to attach the two lips of the wound separately, behind the opening, into the walls of the belly, in order that when they have once become agglutinated to the peritoneum, we may withdraw their threads, and cure with one operation the wound of the belly and that of the intestine. If the wound is longitudinal this practitioner proceeds in the following manner: a small thin oiled piece of light wood twelve to fifteen lines in length, and four to six in breadth, is first introduced into the interior of the intestine. A noose of thread attached upon the middle of this piece of wood, and the two extremities of which thread are each armed with a needle, is then passed from one side to the other, and from the interior to the exterior, and through the entire thickness of the walls of the abdomen, in such manner that the small plate of wood presses at the same time the two lips of the intestine against the two sides of the abdominal wound, which latter it also at the same time keeps hermetically closed. When the adhesion of these different tissues appears to have been sufficiently consolidated *M. Raybard* withdraws his thread; the little plate of wood comes away with the stools, and from that time we have nothing more to attend to than the cicatrization of the wound of the belly, if, in fact, that has not already been accomplished. If we may object to this process, that it produces designedly adhesions which necessarily prevent the intestine from reacquiring its primitive mobility, it is proper to add that in the other sutures the same thing is almost as certain to take place, if not to as great an extent, also whenever we retain the extremities of the thread at the outside. It may be also said with truth, that when we abandon the intestine behind the wound, after having divided the thread close to the peritoneum, we do not even then any more escape this result. The adhesive inflammation essential to cicatrization scarcely ever fails to unite the periphery of the

visceral wound to the tissues which cover and surround, or are in immediate contact with it. Another objection is that the employment of the plate of wood, though applicable to longitudinal divisions, from *penetrating wounds* into the abdomen, are no longer so in cases where the parts have escaped through a hernial opening. There would also, moreover, be danger that the extremities and edges of this foreign body might perforate by ulceration or gangrene the coats of the wounded intestine.

III. *In conclusion*, therefore, whether we retain the intestinal noose or leave it in the abdomen, it cannot cicatrize without becoming adherent to some extent with the neighboring parts; so that under this point of view, everybody should be left to act according to his own particular ideas. Nor can I seriously blame M. Guillaume for using the suture to the exterior wound, in a patient in whom he had employed, for a division of the intestine, the glover's suture. Finally, if the walls of the organic cylinder should not have been divided or perforated but to the extent of one or two lines, we should have acted still more promptly by seizing its two lips at once with the forceps, and closing them by passing a ligature around them, in the same way as in tying the extremity of an artery. M. A. Cooper and another surgeon, I believe, have each succeeded in a case in the hospitals of London by acting in this manner.

### § IX.—*Accidental or Artificial Anus.*

The operations, by means of which art has sometimes succeeded in the cure of artificial anus, are quite few. For a long time even no attempt was made to devise any, and it was scarcely until the middle of the last century that operative surgery seriously occupied itself with this disgusting infirmity, which, in the case of a woman mentioned by Wedemeyer, (*Journ. des Prog.*, t. IV., p. 234—*Bull. de Fér.*, t. XII., p. 64,) was cured by her becoming pregnant, and which I have myself seen in two instances, and as has been related in many others, frequently disappears also of itself.

A. *Suture.*—One of the earliest processes which here suggested itself to the mind under the character of an operation, was the suture. It would naturally appear that by approximating the lips of the wound previously abraded, and by maintaining them in contact, we should compel the matters to resume their natural course, and to pass into the lower end of the intestinè. Lecat, who was the first to declare his intention of putting this method into execution, had admitted into his hospital, in the year 1739, with the object above indicated, a woman who had been affected with artificial anus for several months; but various circumstances, over which he had no control, led to a failure of his essay. Lebrun was more fortunate, and carried out into practical operation the idea of Lecat. A suture in the form of a cross appeared to him to answer the purpose in the patient who fell under his treatment. For the purpose of abrading the lips of the wound, he made use of a caustic. For two days every thing appeared to promise a successful issue; there were no accidents, and the cicatrization had already advanced very far, when on the third day it became necessary to remove the threads and to give issue to the matters. Lebrun wait-

ed with the intention of renewing the operation at a somewhat later period, but the patient would not listen to any such proposal. This attempt, which few surgeons have ventured to repeat, has been generally condemned. It however has been made trial of by M. Judey, (*Arch. Gén. de Méd.*, t. I., p. 291,) for an accidental anus which had existed for four months. The success was complete, according to M. Richerand. M. Blandin appears to have been less fortunate, as accidents soon obliged him to reopen the wound.

B. *Anaplasty*.—It was natural that a modification of this process should be suggested, and such in fact has been the case. The integuments in general are so indurated and so blended with the subjacent tissues at the periphery of the wound, that it would be difficult to approximate its lips or to bring them into contact. M. Collier has suggested that a portion of skin detached from the neighborhood, and brought forward and attached by threads or pins on the accidental anus, according to the principles of anaplasty, would obviate this inconvenience. A patient treated by him in this manner was perfectly restored, and it is a mode of proceeding which I shall recur to again farther on.

C. *Compression*.—Compression is a method which has been made use of with advantage in more than one instance, and is still frequently employed at the present day. It is moreover in many cases indispensable as a preparatory or subsequent auxiliary means, to remove certain complications which would render the application of the other processes altogether impossible.

I. *Strangulation of the invaginated intestine*.—The intestine may become invaginated through the artificial anus, protrude to the outside, and ultimately, in certain cases, form a tumor which has been seen to acquire the size of six inches, and even a foot and more in length, assuming the form of a cylinder, through the extremity of which the alimentary matters made their escape. It is evident that an invagination of this kind constitutes of itself a serious disease. Thus, as Hébréard (*Bull. de la Fac. de Méd. de Paris*, t. I., 2d year) saw in a patient who had been affected in this manner for twenty-four years, and as many other surgeons have also had an opportunity of remarking, its root is liable to become strangulated like any other species of hernia. Patients have died in consequence thereof. I have no need of remarking, that when this *strangulation* exists, we ought, if the reduction cannot be effected in any other manner, to lay bare the ring and incise it from within outwards, in a word, divide the stricture as in ordinary hernia. The case of a child mentioned by Hippocrates, the young man cited by F. de Hilden, and the cases of Albinus, Lecat, Puy, Leblanc, Schmucker, Bidault, Sabatier, Desault, Scarpa, and Howship, collected by M. Arronshon, (*Mem. de Chir.*, 1836, p. 26,) who also saw one himself, show what the surgeon has grounds for apprehending from these eversions of the intestine through an accidental opening of the walls of the abdomen. The débridement performed by M. Veiel, (*Arch. Gén. de Méd.*, 2d ser., t. VII., p. 542,) in a case of this kind, did not prevent a fatal issue.

II. *Compression of the invaginated intestine*.—Even in the absence of any constriction, the intestinal cylinder, with its mucous membrane thus everted and outside of the ring, does not remain long in this position

without undergoing various alterations. Thus there is danger that the peritoneum of its invaginated portion may soon contract close adhesions with that of the containing portion, and that the other tunics may become thickened and indurated to such degree as to render its replacement difficult or even altogether impossible. It is for the purpose of remedying accidents of this character that compression has been recommended. Desault, Sabatier and Noel, were the first to point out its efficacy, since which it has become a resource which to some extent is in common use. If the tumor is long, it is to be enveloped with fine compresses after having cleansed it, and we then apply over it a bandage in the same way as in adjusting a roller bandage on the limbs. During the first days, the diminution of a mass of this description being very rapid, the bandage should be renewed frequently. At a later period it is only to be reapplied at longer intervals. If the serous surfaces of the organ do not present an insuperable obstacle to this course, we shall soon have it in our power to return the intestine into the belly.

III. *Compression of the spur, (l'éperon.)*—It is evident, moreover, that after this reduction the artificial anus will nevertheless continue to remain, and that something else is required to effect the removal of this. As the projection, or species of spur, or prominent border which separates the upper from the lower end of the intestine, is the principal obstacle to the passage of the matters from the first into the second, it was natural to hope that by pushing back this projection we should, in some instances, succeed in effecting a cure. Compression, therefore, was suggested for this also. It is in the school of Desault that it has received the greatest number of partisans and useful improvements. Desault expected by *means of tents*, first introduced into the lower and then into the upper end, and fastened at the outside by a thread which embraced the middle portion, to clear out in this manner for the matters a passage which they would soon take. After having inserted his *meche*, he applied a pyramidal tampon on the eperon to support its convexity and to push it as far as possible towards the belly. By this means he gradually depressed the eperon, and finally succeeded in obliterating a great portion of it. After these meches could be introduced of a large size, and that the stools had become almost perfectly free, he confined himself to compressing the exterior division in order to prevent by this means any kind of exudation. It cannot be denied that a treatment so judiciously conceived has in more than one instance been followed by success. Nevertheless the presence of a tent filling up the two ends of the intestine, and of the pyramid of lint or of compresses which hermetically close the wound, is not always supported by the patient without some inconvenience. Some under such circumstances are attacked with colics and pains so acute that the method has to be laid aside. Another means of effecting the same result has been sometimes employed at the Hotel Dieu. This is a species of *crescent of ebony* or ivory, six to eight lines in length, having a handle five or six inches long, and fitted with a sponge or compress. This being introduced to the bottom of the accidental anus, embraces by its concavity the intestinal projection, which is pushed back by making pressure upon its handle, which is likewise wrapped in linen, and which may be

easily kept immovable by means of a truss or any other suitable bandage.

D. *Enterotomy*.—The labors of Scarpa in elucidating the mechanism of this affection, have shown that what this author calls a *promontory* is caused by the adossement of the two ends of the intestine, which present themselves behind the ring in the manner of the bores of a double barrelled gun. Such being the fact, they naturally sought means not only to push back this eperon, but in fact to destroy it.

I. Schmakhalden appears to have been the first to have conceived this idea, which he made public in his inaugural dissertation in the year 1798. He recommends that we should traverse, by means of a curved needle, the base of the eperon, and that we should thus introduce through it a strong ligature, in order, by making traction upon this thread, to cut through it by degrees in a longitudinal direction, or that we should proceed after the manner of treating fistula in ano by apolinosis.

II. According to J. S. Dorsey, (*Elem. of Surg.*, vol. II., p. 96,) Physick made trial of a similar process in January, 1809, and succeeded perfectly.

III. The proposition of the German surgeon received no attention in his own country, and that of the American author would also probably have passed unnoticed, had it not been that Dupuytren, about the same epoch, viz., in 1813, made an effort on his part to bring it into repute in France. Like Physick, the surgeon of the Hotel Dieu limited himself, in his first trials, to the introduction of a thread through the eperon, in order to cut through it from behind forwards. The adhesions which the peritoneal surfaces would contract around the adossement, were calculated to prevent any kind of effusion into the belly. The matters being no longer pushed towards the ring, and finding an outlet in the lower end of the gut, would naturally take that route and resume their course towards the rectum. Though several trials had confirmed these anticipations, Dupuytren soon perceived, however, that the needle might go beyond the protecting adhesions, and perforate a point of the alimentary tube, communicating with the interior of the peritoneal cavity. Intimidated by this danger, he devised an enterotome, the inner face of whose branches was undulated, in order that it might more accurately embrace the parts, and that these latter might not slip upon each other. Being articulated in the manner of a forceps, its extremities in the direction of the intestines, were shut and approximated by means of a screw passed through its handles. One of the branches of this instrument was to be applied upon each portion of the intestine, in such manner as to include its eperon to the extent of an inch or an inch and a half. The pressure necessarily brought about the mortification of the tissues, and an immediate interruption to the circulation. It is easy to understand the character of a process of this description. The peritoneum is placed in contact with itself upon the periphery of the enterotome. The eliminative inflammation develops itself by degrees, and is transmitted to the distance of some lines upon the outside. Solid adhesions are the necessary consequence, and no perforation therefore is to be apprehended in the direction of the peritoneum. In proportion as the eschar detaches itself, the instrument

becomes more and more movable, and comes away entirely, as soon as the former is completely isolated. Should the compression not have been sufficiently powerful at first, the blood might still continue to circulate between the branches of the forceps. In that case the gangrene would not take place, and the exterior peritoneum might not be inflamed to a sufficient extent to bring about the adhesions required. We would have to apprehend a perforation in the direction of the belly, and the failure of the division of the morbid septum. And even admitting that it should have taken place, the pain notwithstanding will be more acute, and the cure much more tardy. This method, which was employed in more than twenty instances by Dupuytren, and afterwards by MM. Hery de Bonneval, Lallemand, Delpech, Simonin, (*Décade Chir.*, 1838, p. 75,) and other practitioners, has up to the present time occasioned serious accidents only in a small number of cases. As soon as the perforation is effected, the matters pass into the lower intestine and the stools are re-established. Each day less and less passes through the wound, which latter speedily contracts, and is soon reduced to the character of a simple fistula, if it is before the cicatrization has been entirely accomplished. Fever rarely follows, and some symptoms of colic or of inflammation, extending to a slight distance towards the intestine and peritoneum, are the only accidents that have been noticed, while in most cases the patients rarely experience any inconvenience from its employment. A patient, however, operated upon by M. Lesauvage, (*Arch. Gén. de Méd.*, 2e sér., t. XII., p. 351,) died after the expiration of a few months, though there was a decided contraction of the perforation. I have seen a woman die on the tenth day from this process, in consequence of peritonitis. The eschar, which had detached itself on the sixth day, had not yet become surrounded with adhesions, and I know that similar results have been noticed in other hospitals.

IV. Some persons, however, have endeavored to make an additional improvement of this process by modifying the enterotome forceps. Thus, *M. Liotard* has suggested an instrument or species of punch, which is made use of by *M. Blandin*, and which cuts out a circular flap from the morbid septum without touching its free border, in such manner that an opening is thereby made, which is modelled in some respects after that of a natural intestine. This process would possess the disadvantage of not being adapted to all cases, that of incurring the risk of pinching up some sound portions of a free noose of the intestine, which might happen to get behind or between the two branches of that portion of which we were desirous of perforating the septum of adossement, and finally, the disadvantage of being difficult of execution, for the plates of *M. Liotard* are too large to be easily introduced through any artificial anus whatever, or through the ends of the intestines themselves, which latter, in such cases, are usually contracted to a very considerable degree.

V. *Delpech* has used an instrument which acts nearly on the same principle as that of *M. Liotard*. This enterotome, revived as something new, and used in one instance with success by *M. Lotz*, (*Gaz. Méd.*, 1836, p. 746,) is a long forceps, terminated by two concave hemispheres (coques,) slightly elongated, and very nearly similar to

the shells of a walnut, and the circumference of which is slightly concave in the direction of their length. They are introduced separately; as they do not make compression at first, except at their beak, the septum is divided only by degrees, and from behind forwards, while with the enterotome of Dupuytren, the compression being generally so much the greater in proportion as we approach nearer to the heel of the instrument, the gangrenous division is accomplished from before backwards. Delpech, moreover, was fully conscious that his forceps, though useful perhaps in some particular cases, could not in general be substituted for that of Dupuytren or that of M. Raybard. It might, I should imagine, possess some advantages when the septum is exceedingly long and situated at a great depth, or when, in order to reach it, we are obliged to pass through an irregular and more or less sinuous passage; but these are details which can never be subjected to the rules of a systematic description, and which must be left to the judgment of the surgeons to whose notice the cases present themselves.

E. In this method, moreover, as in every other two things are to be distinguished, the object in view, and the means by which it is to be attained. It is upon these last only, as it appears to me, that there can be any difference of opinion at the present day, and there is no reason why we should not make still further attempts to simplify them. Since by depressing the eperon in artificial anus, we make a passage for the matters, why not effect this depression by means of a canula, which would at the same time allow of the cicatrization of the exterior division? This advice has been given by *M. Colombe*, (*Bibliot. Méd.*, 1827, t. I., p. 389,) and M. Forget informs me that he advanced a similar opinion in the year 1824. M. Colombe recommends that we should insert the extremities of a large gum-elastic canula two to three inches long, into the two ends of the intestine, which canula being slightly curved, would rest at its concavity upon the free border of the septum, and would have attached to the middle of its convex side a thread, for the purpose of retaining it until the wound should have almost entirely closed up, or that the course of the matters had been sufficiently well re-established to lead to no farther apprehension of their escape externally. At first sight a process of this kind seems to be worthy of consideration, and appears to be specially applicable to those cases in which the entering (reentrant) angle formed by the mesenteric wall of the intestinal noose is very open, and where the eperon is not very projecting, and to those cases more particularly, in which the intestine has not been destroyed throughout the whole extent of its circumference; but in the others it is to be apprehended that it would prove insufficient, and that it would have to give place at least to the process of Dupuytren. I would remark, that in order to have a decided prospect of success, it would be necessary to make use of a large sized canula, the introduction of which should necessarily be attended at first with a considerable degree of difficulty. I used it at La Pitié, in the month of August, 1831, and the patient succumbed three days after, under symptoms of an intense peritonitis. The intestine was perforated behind, and the canula had perforated into the opening. Whether this perforation was the effect of the canula or a

simple coincidence, certain it is that a result of this character does not speak much in favor of the method.

F. *Excision*.—It is proper to remark also that the process of Du-puytren is not the only one which might be attended with success. *M. Rayé* (*Bull. Méd. de Gand.*; *Gaz. Méd.*, 1838, p. 445) seizing the eperon with a good pair of polypus forceps, afterwards excised a V flap from it with the scissors, and his patient was promptly cured.

G. *Complications to be encountered*.—When the surgeon has decided upon undertaking the cure of artificial anus he must reflect at first upon the difficulties which in certain cases present themselves, to the introduction of the *enterotome*. If the integuments have not been largely laid open, or if from any cause whatever there should have been developed in the neighborhood sinuous passages or sternocoral fistulas, or if a tumor or openings or an erysipelatous inflammation exist in front of the gut which it is our intention to enter, there can be no doubt that we ought to begin by combatting and getting rid of these various impediments, either by means of the proper incisions or excisions, or by sanguineous evacuations, general and local, topical emollients or laxatives, baths, lotions, &c. It was in this manner I saw formed in a patient whose strangulated hernia had never been operated upon, five or six openings and a tumor as large as the fist in front of the ring, a tumor which was occasioned by the thickening and habitual chronic inflamed state of the skin, the cellular and adipose tissue and various lamellæ contained in the inguinal canal. I was thus obliged to circumscribe this mass by two semilunar incisions, and in order to remove it was compelled to cut down to the root of the spermatic cord, that I might lay bare the intestinal opening. In such cases moreover it is to be recollect that the operation is to be performed in two stages; that is, before proceeding to the use of the *enterotome* we must wait for the cure of the wound which has been made. In other cases we are obliged to dilate for a week or two the artificial anus itself. In certain others the cutaneous orifice is so remote from the intestine that we meet with considerable difficulty in penetrating into this last. The perforated noose of intestine may also be tortuous or twisted, either in the interior of the canal itself or behind the ring, or it may have formed duplicates which have contracted adhesions with each other, and thus give rise to difficulties which it is important to overcome before proceeding farther. The lower end also of the intestine, which is always contracted to a great degree, may be situated above the upper end, around which it may have become twisted in the manner mentioned in the case which is found in the memoir of Delpech. Though the obliteration of this portion of the alimentary tube, however ancient the disease may be, is unfrequent, it is however possible. A case noticed at the Val-de-Grace in an old man who had had an inguinal artificial anus for forty years, places this fact beyond dispute; so that it is as well to think of this fact before applying the forceps upon the septum we are about to destroy. At however slight a depth therefore the wound may be situated, or however little doubt may exist upon the character of the relations between the orifices of the abnormal anus, we ought to endeavor to dilate gradually the passage which conducts into the

upper intestine, and do the same for the lower also, by means of long meches, bougies, sounds and gum-elastic canulas, or by portions of prepared sponge, and never have recourse to the enterotome before having been enabled, by means of the finger, to recognize the position of the parts and the relative situation of the septum with both ends of the intestinal tube.

H. *The Operative Process for Enterotomy.*—When we have reached this point the operation, properly so called, may be performed. The patient is to be placed in the same manner as for kelotomy. The forefinger of the left hand serves as a guide to one of the branches of the forceps, which it conducts under the lower surface of the eperon to be destroyed. An assistant is directed to keep it in its place, while the operator introduces the other in the same manner into the upper end of the diseased tube. He now grasps both the branches; turns them upon their axis in such manner as to be enabled to unite them together; passes his finger almost as far as their extremity, in order to ascertain to what extent they embrace the eperon and to what distance he may insert them without danger up to the point where he wishes to effect the mortification. The quick screw or any other suitable means for shutting them, is immediately applied upon the extremity of their handle, and compression made to the degree required for suspending, as we have said, the circulation or vitality in the septum which they embrace. Nothing more remains to be done than to surround them with lint and compresses, and secure the whole by means of a bandage, which terminates the operation. The patient being carried back to his bed, is subjected to the regimen used in serious operations. The lint and other portions of the dressing are to be renewed as often as the exudation of the matters require, taking care however that the requisite precautions are observed to prevent the forceps from being disturbed in their position. Should accidents be developed they are to be met by such means as each one of them may require; as soon as any gurgling sounds are heard or the least tenesmus manifests itself, irritating injections become absolutely necessary, especially when the instrument begins to be loosened, and when the separation of the eschar should appear to have already taken place. The subsequent treatment has nothing further of a particular character; the patient should maintain the horizontal position, take from time to time an aperient, have recourse frequently to enemata, and take all kinds of nourishment.

I. *In respect to those kinds of artificial anus whose cure cannot or ought not to be attempted,* the best means to be employed is the species of box contrived by Juville. Any other description of vessel constructed on the same principles, and those kinds of vessels or instruments which are found at most bandage-makers or manufacturers of surgical instruments, would moreover fulfil the same intention.

J. *Additional remarks upon artificial anus.*—It would be readily supposed, from what has preceded, that artificial anus is a disease which can require no farther investigation. One important step was to have established in a precise manner the influence of the infundibuliform contraction of the peritoneum upon the progress of the matters towards the neighborhood of the fistula. Another was that of show-

ing that if the contents of the alimentary tube escape by the accidental opening, rather than continue to pass from the upper into the lower end of the intestine, it was to be imputed to the septum or species of promontory or mesenteric eperon situated between them. A third point gained finally, and unquestionably the most important of all, was the knowledge how to destroy this eperon, since the cure of the disease depended upon that result. The knowledge in fact that we could obtain this result has, in some measure, thrown the other acquisitions, made into oblivion. The minds of surgeons, exhausted as it were by such successful results, have from that time fallen back again almost into a state of perfect indifference. In this respect however, as in many others, surgery is still far from having reached perfection. *The adhesion of the intestine to the root of the sac is frequently less intimate than Scarpa alleges. The membranous funnel is frequently wanting. The adhesive inflammation does not always take place at the periphery of the enterotome, even after it has been applied in the most judicious manner. In some cases it is almost impossible not to include between the branches of the instrument a portion of some important organ at the same time with the abnormal septum. Finally, many cases of artificial anus and of stercoral fistulas will persist to an indefinite period of time, in spite of the destruction or absence of every kind of eperon.*

Georget, a farmer, 39 years of age, entered into my department of the hospital of La Pitié, on the 28th October, 1834. I examined him at my visit on the 29th and perceived at the outer angle of the right pubis, a red colored border formed by the everted intestine. Below this was found a fistula which allowed of the introduction of a probe into the perforated intestine. The patient was anxious and desired to be operated upon immediately. On the 2d November an acute erysipelas made its appearance around the wound and death took place on the 9th.

*Morbid Appearances.*—1. The upper portion of the ileum is attached to the inner and lower portion of the inguinal ring, where it is slightly adherent, and in such manner as to be continuous with the fistulous ulcerations noticed during life. 2. The lower end of the same intestine ascending from the pelvic cavity into the iliac fossa turns round upon the outside of the other, in order to enter into the hernial canal, and to reach down to the groin, where it formed the actual orifice of the artificial anus. 3. By raising these two portions posteriorly, they were so easily separated from the neck of the sac, that the slightest effort would have been sufficient to produce an effusion into the peritoneal cavity. 4. It would have been impossible during life, to have strangulated the eperon by means of the enterotome, without causing this effusion. 5. There was not the slightest appearance of infundibulum, and the sac was closely adherent to the inguinal canal. 6. The two portions of the intestine were in contact at their side, and not at their mesenteric border. 7. At different intervals this adossement was merely that of contiguity, and in such manner as to allow it to be destroyed without the slightest rupture. In this case, therefore, the total absence of infundibulum, or of a membranous funnel, would have constituted an insuperable ob-

stacle to the spontaneous cure of the artificial anus, which however had existed for the space of seven months ; while the feeble character and extent of the adhesions would have almost unavoidably occasioned a fatal effusion into the belly, had the slightest operation been attempted. Upon the supposition that we could have succeeded in destroying the intestinal septum, the matters nevertheless would have doubtless continued to pass through the wound, since even in that case the contortion of the intestine would have rendered their transmission from the upper into the lower gut next to impossible.

The following is a fact of another character, though not dissimilar to the preceding. Martigny, a day laborer, 56 years of age, had been laboring under a crural hernia on the left side, for the space of 18 years. On the 17th April, 1835, there came on vomitings, and a few days afterwards symptoms of inflammation. The patient entered La Charité on the 26th of the same month. The fold of the left groin presented a red irregular tumor, which exceeded the size of an egg. Repeated efforts of the taxis were unavailing. Gases of a gangrenous odor were disengaged, and the mortified parts were excised. Two incisions were now made at the seat of the strangulation. On the 30th April the dressings were saturated with faecal matters, but on the 6th May the pain had almost subsided. On the 10th, compression was applied by means of small balls of lint, and on the 14th the forceps of Dupuytren were introduced and tightened upon the eperon. On the 18th, the patient experienced only some slight attacks of colics at intervals, when the forceps were gently tightened again. On the 19th the colics were more violent, with pain on pressure in the hypogastric region. Nauseas with vomiting succeeded, and on the 20th the symptoms became more aggravated, and the belly exceedingly sensitive. On the 21st, we removed the forceps, which were found to include between its branches a portion of gangrened intestine. The belly was tympanitic, and the face shrunk, and death took place on the afternoon of the 22d. A part of the epiploon was found adherent in front of the strangulated intestine, and shutting up its cavity on the left. On turning back this epiploon, we found the two ends of the intestine with their lips detached. Upon the inside, the eperon was destroyed to the extent of two inches ; but there was no adhesion except on one of the sides of the division. The other border was cut perfectly smooth, and it was evident that a certain portion of the stercoral liquids had made their escape through here. The pus in the neighborhood was tinged with them, and the entire peritoneal cavity was filled with sero-purulent matters. The entero-mesenteric septum had prolonged itself into the groin. The remains of the sac exhibited no disposition to become displaced, or to be drawn in the direction of the belly. There are no reasons for supposing that it would have been possible to have established in that place a membranous funnel. In this case, the adhesion which the enterotome usually causes around the portion of tissues it strangulates, had been but imperfectly accomplished ; it is also to be added that in front, where alone this adhesion existed, it would have been impossible for it to have retained the matters without the expansion of the epiploon which covered it. Moreover, inasmuch as from the first to the fourth day, no accident supervened, we may affirm I think, that the peritonitis

was the result of the mortification of the eperon, and not of the hernial strangulation.

A woman whom I operated upon in 1833, with Dr. Bonis, for an enormous strangulated gangrenous umbilical hernia, died two months afterwards with an artificial anus, in my department at the hospital of La Pitié. The particulars in relation to the operation were communicated at the time to the Royal Academy of Medicine, (*Arch. Gén. de Méd.*, 2e ser., t. II., p. 285.) I wish to recur at the present time only to the portion which relates to the condition of the parts in the belly. It was the small intestine which had escaped through the umbilicus, and the convex border of its upper end was the only portion which remained partially adherent behind the ring. The other end was more than an inch distant from it; nevertheless no effusion had taken place into the abdomen. The epiploon on one side, a sound noose of the intestine on the other hand, and thirdly, a false membrane, had become agglutinated all around, as if for the purpose of forming the canal or funnel down to the umbilicus. The matters thus, which had never absolutely ceased to pass into the cæcum, must, before issuing from the wound or entering into the lower end of the perforated intestine, have fallen or glided down upon this species of accidental plane. The sinus, or cul de sac, corresponding to the mesenteric side, was occupied moreover by another portion of the small intestine, bent into an acute angle, and agglutinated in a solid manner upon the points upon which the enterotome would have had to have been applied, had it been judged advisable to undertake the operation. We perceive, therefore, that it not only would have been difficult to have reached the eperon, but moreover that in compressing this septum, we should have inevitably strangulated another noose of the alimentary canal, and caused the death of the patient.

K. *An anus without eperon.*—Artificial anus and intestinal fistulas unaccompanied with an eperon, may be established in three ways that are quite different: 1st. If after the reduction of a hernia which has been previously operated on or not, an opening shall have formed upon the convexity of the intestinal noose, it may happen that the matters issue in the direction towards the skin, and that an artificial anus will be the consequence. 2d. An ulcer commencing in the mucous membrane may cause an adhesion of the intestine to the corresponding part of the abdomen. Continuing its progress outwardly, and having perforated all the tunics, this ulcer will cause a stercoral abscess and may terminate in a fistula. As the intestine is not displaced, it may neither be bent into an angle nor contracted. Hence in such cases the artificial anus or the intestinal fistula must in most instances be without an eperon. 3d. Frequently, after the destruction of the eperon by the method of Dupuytren, the artificial anus persists under the form of a fistula which cannot be closed up by any means applied.

a. *An anus without an eperon and resulting from hernia or a wound.*—The first description of anus without an eperon comprises several varieties. Thus, in some instances, it originates from a gangrenous portion of the intestine which has been pushed back into the belly before being perforated. In other cases, on the contrary, it depends on a rent or laceration of the hernia itself, which has taken

place during the efforts at the taxis, or even at the moment of reduction. Again, it arises, after having laid bare the hernia and effected the debridement, from our having pushed back into the belly, designedly, or contrary to our intentions, or through mistake, the gangrened intestine, with or without perforation, and ulcerated through and through from the peritoneum to the mucous membrane, or vice versa. In other cases, finally, it results from the intestine which has been wounded by an instrument penetrating into the abdomen, or from the operation of hernia, or in any other way, having been left, or been returned in its place into the peritoneal cavity. 1st. These four varieties are divided into two very distinct orders, according as there exists or not at the same time a division of the external parts. *In the first case, that is to say, where the walls of the belly are laid open*, as after the operation for hernia, or from a penetrating wound, the artificial anus or fistula is established immediately, and without being necessarily preceded by suppuration or an abscess in the neighborhood. In the second case, that is to say, where *no solution of continuity* has been made in the belly, as for example, in consequence of the taxis, a stercoral abscess, on the contrary, is almost the inevitable precursor of an artificial anus. Nature here makes use of a process which comprises two elements. It is necessary, in the first place, that adhesion should have taken place between the periphery of the intestinal perforation and the corresponding part of the walls of the abdomen. In the second place, there must be an exit established between the ulcer and the exterior. Now it is immediately perceived that this last stage of the morbid process is infinitely more complicated and difficult in the one case than in the other; that with the previous opening of the hernia or through the abdominal walls, nothing is more simple; while, in the other case, the abscess which is developed may extend to a considerable distance, gangrene the parts over a large surface, and ulcerate the skin in a great number of places. The intestinal lesions also under consideration, are far from always terminating in the same manner, and their treatment must be varied according to certain circumstances. 2d. *Wounds and perforations without gangrene*, as in a hernia, for example, may be reduced and *heal up* in most instances, *without the intervention of any description of suture*. The intestine being returned into the belly, remains behind the ring and becomes agglutinated to it. The parietal peritoneum agglutinates to the peritoneum on the borders of the intestinal opening, while the mucous membrane becoming swollen and reversed outwardly, shuts up the wound, and presents a complete obstacle to the effusion of the matters. After the cicatrization the patient recovers, with the exception only of some slight colics or tractions in the neighborhood of the wound. To the facts which may be adduced in support of these assertions, I might add two others which belong to myself.

A woman 55 years of age had a crural hernia which had been strangulated for the space of four days; she was brought into my division at the hospital of La Pitié in 1833. I proceeded immediately to the operation, which at first presented nothing peculiar. A noose of small intestine which was seen at the bottom of the sac, with a livid tint of a very suspicious character, nevertheless preserved suf-

ficient firmness to banish all idea of gangrene. After having divided the stricture, I drew the noose out in order to have a better opportunity of examining it. We then ascertained that it was ulcerated in three places. Pressure caused the intestinal matters to issue out through the three openings, which were reversed in the manner of a chicken's rump, (*en cul de poule*), distant from two to three lines apart, and situated upon the convex portion of the intestine. A probe introduced into one of them entered freely into the intestinal canal. After having hesitated a long time and noticed that these openings had sensibly diminished in diameter by emptying the intestine, I decided upon returning the latter into the abdomen. The wound was kept open, and the patient maintained in a state of complete immobility. My fears, I confess, were extreme, but no accident supervened, and this patient recovered as rapidly and as perfectly as if it had been a case of hernia without alteration of the intestine. Not the slightest particle of stercoral matters ever escaped from the wound, which cicatrized at the expiration of a month, (*Arch. Gén. de Méd.*, 2nd ser., t. I., p. 595.)

Another woman operated upon in the same hospital, in the spring of 1834, furnished me another instance. This patient, who was 47 years of age, stout, of an ordinary embonpoint, and in robust health, had had for a long time an imperfectly reducible hernia. When I saw her the symptoms of strangulation had existed for the space of 24 hours. Having in vain made another effort with the taxis, which had already been made trial of under every variety of shapes, I proposed the operation, which was accepted and performed immediately. Before arriving at the sac, it became necessary to push aside or make an incision into several degenerate ganglions. An adipose lardaceous layer then presented itself; a cyst filled with blackish-colored liquid was the next that appeared, and exhibited before us a surface slightly rugose, bosselated and resisting, which possibly might be the indurated sac, and which I proceeded to divide layer by layer, under the apprehension that it might possibly be the intestine, when a sudden and unexpected movement in the patient caused me to make a complete incision into it to the extent of eight lines. Mucous dark-colored matters, and afterwards yellow and frothy, immediately made their escape through the wound. The mucous membrane being laid bare was easily recognized; my ability to pass the finger into the belly through the cylinder I had opened, together with all the other attending circumstances, satisfactorily proved that the instrument had entered into the intestine. Emboldened by the preceding case, which was still present in my mind, I ventured immediately to reduce the wounded intestine. The wound had at least eight lines in extent. Its direction, moreover, was parallel to that of the intestine, and it was situated upon its convex portion. The most absolute repose was prescribed. I placed a linen besmeared with cerate into the crural ring. The division of the external parts was kept open by small balls of lint, and the rest of the dressing supported merely by a containing bandage, and without any actual compression. The course of the matters was re-established through the anus on the following day, when the vomitings as well as the other symptoms immediately ceased. None of the contents of the alimentary canal came

out by the groin, and the patient left the hospital in a state of perfect health on the 35th day. I have seen her twice since ; she wears a precautionary bandage, and suffers only some slight colics when she has walked much, or eaten more than usual.

M. Castara, (communicated by the author, 26th Nov., 1838,) found six sharp-edged nuts, in a strangulated and perforated intestine, which he had cut into, in order to extract from it these foreign bodies ; his patient recovered like the preceding, without any artificial anus. It may moreover be readily conceived, that the result might not in every case be so satisfactory. The intestinal wound, either on account of its extent, direction, or form, or owing to the constitution of the patient, may, should it not close, continue to give exit externally, to the matters which pass through the alimentary tube, and be in this manner transformed into an artificial anus. 3d. If, as happens quite frequently, *the intestine should be ulcerated*, or divided transversely on one of its points, in *the ring* for example, the reduction would present but a slight prospect of cure, and would scarcely enable us to hope for the spontaneous formation of a simple artificial anus. As the reduced organ continues almost always, in such cases, to maintain behind the ring the same relations as in hernia, that is to say, in such manner that the portion which was free in the sac, is precisely the same which remains opposite to the canal in the belly, the following are the results which may happen : 1. The periphery of the perforation, contracting adhesions with the corresponding part of the contour of the ring, causes the course of the matters to be immediately re-established through their natural route, and the cure to take place as in the preceding case. 2. However slightly retarded or incomplete the adhesions may be, a certain quantity of matter will effuse itself into the neighborhood. This effusion sometimes spreads into the peritoneal cavity, and speedily causes death. In most cases, it is moderated, confined, and circumscribed in the iliac fossa, by means of the adhesive inflammation of the surrounding peritoneum. In such cases, it is nothing more than a stercoral abscess, which in some instances opens at the ring, where it afterwards terminates in an anus or fistula ; while in other cases it forms in another place, and in such manner as to make its way into the peritoneal cavity, into some hollow organ, or into the substance of the walls of the abdomen. In a patient whom I operated upon in 1831, in company with Dr. Florence, a collection of this kind had formed internally near the bladder, and between the peritoneum and muscles. Its size was at first so considerable, that we attributed it at first to a retention of urine ; finally, it made its way into the ring, but death did not take place until the twenty-seventh day. In a man whom I operated upon in 1836, in the department of M. L'Herminier, at the hospital of La Charité, and who died twelve hours after from peritonitis, the adhesions, though recent and slight, had however been sufficient to retain the matters in the iliac fossa, and to force them to take a direction, in part, towards the ring, though the ulcer in the intestine was very large, and situated outside of and above the crural canal. I met with a similar case in a patient of M. Lacroze in 1834, and two others since at La Charité. A woman whose hernia had become gangrenous at her residence, entered into the

clinical wards ten days after, with an artificial anus. The course of the matters was partially re-established, but the iliac region became swollen and painful. The finger, introduced into the fistula, made slight traction upon its outer angle, when more than a litre of purulent serum, mingled with stercoral and albuminous flocculi, immediately escaped from it; an abscess had been formed there. 4th. When instead of a solution of continuity without previous mortification, the intestine is the seat of wounds, or of some *gangrenous perforation*, its reduction no longer presents the same prospect of cure. If it is complete, and peritonitis has not destroyed the patient beforehand, the accidents will not supervene until at the expiration of a few days, an eliminative process being required to detach the eschar. If on the contrary the perforation already exists, at the moment of making the reduction, we shall know what to expect in regard to the progress of the symptoms. In both cases, an adhesive inflammation agglutinates the sound parts, around those that are diseased. In both cases, also, an artificial anus is formed without any difficulty, if the perforation, whether it be primitive or consecutive, corresponds to the ring. But if the gangrene is situated on another point of the intestine, we shall have, in the first case only, some chances of a cure without an artificial anus, and in the second, or where both exist together, an effusion or stercoral abscess, with all its consequences, as in the preceding case. Whatever may be the nature of the disease, the loss of substance is too decided in a case of gangrene, to allow us to count upon the immediate closure of a wound of this description. It is, nevertheless, remarkable that even in such cases, the organism hastens, so to speak, to confine the disease behind the ring, by causing, almost immediately, the production of protecting adhesions all around it. 5th. What is here said of hernias that have been operated upon, is applicable in every particular to *the intestines that have been wounded at the same time with the parietes of the abdomen*. 6th. An intestine which has become gangrenous or perforated in any manner whatever, and been reduced by the taxis, and without incision of the envelopes of the hernia, is also placed in the same condition as in the preceding case, with this difference, that the anus or fistula cannot be established at first, that an abscess must precede its formation, and that the cure, without effusion or by first intention, is next to impossible. The cause of this peculiarity is sufficiently evident from the details I have given, to allow me to dispense with their repetition. In a woman who had a crural hernia, which had been strangulated for the space of three days, and who was dying from an extensive peritonitis, when an attempt for the first time was made, and succeeded in effecting its reduction, the intestine, which was gangrened and largely perforated, nevertheless continued to be agglutinated to the peritoneum, around the whole periphery of the ring in the iliac fossa. In a young man, on the contrary, who had been treated in the same manner, an enormous abscess formed, which had to be opened upon the inguinal ring, and in the iliac region, where the artificial anus was subsequently established. 7th. Thus, in whatever manner the artificial anus may be formed in these various modifications, it is destitute of an eperon, because the intestine being placed back in the belly is, so to speak, repaired in the portion of it

which has been destroyed, by means of the corresponding tissues of the other organs.

*b. An anus without an eperon, and caused by an ulcer, or internal perforations in the intestine.*—The intestines are liable to two sorts of internal perforations. In some cases, they ulcerate in fact under the action of a foreign body which has become lodged or retained at some point in their interior; in other cases, on the contrary, there is a true ulceration which ultimately perforates through the whole thickness of the intestine. To the first class belong, the perforations caused by the passage of fragments of metal, glass, wood, balls, bone, kernels of fruit, &c. To the second belong ulcerations of all descriptions, especially those from phthisis, scrofula, and dothenenteritis. 1st. When the case is one of pure ulceration, produced by a foreign body, in a patient who is in other respects in good health, and where the loss of substance is not considerable, such fistulas generally heal up with sufficient promptitude without an operation; but under opposite conditions, it is not unfrequent to see them resist every kind of remedy, and obstinately continue for an indefinite length of time.

The annals of science furnish numerous examples in support of these statements. The blade of a knife, a fork, fragments of bone, &c., have been expelled or extracted through the walls of the belly without any fistula being thereby produced. A woman was admitted into the hospital of the Faculty, in the department of M. Bougon, in 1825, for a pain which she experienced in the right iliac region. This pain was accompanied with a fever, and had existed for the space of 15 days. The stools though rare were always obtained, nor were there any colics. The whole iliac fossa appeared to be affected, and the abscess made its way outward at the expiration of three days. There was discharged a large quantity of fetid pus, gas, intestinal mucosities and stercoral matters, afterwards an angular fragment of bone, which was seven lines in its small diameter, and which apparently belonged to the head of a fish. The accidents afterwards gradually diminished, and in a short time nothing remained but a stercoral fistula, which was reduced to the diameter of three or four lines in the space of 20 days. The dressing with cataplasms was continued, and the alimentary matters passed in part from that period through the natural anus. Nevertheless, an injection given on the 29th day, again made its way through the fistula, which however had entirely closed up on the 43rd. A permanent cure was perfectly established. I saw the patient four months afterwards and there was no return of the disease. 2nd. When the ulceration arises from the influence of a constitutional malady, or spontaneous inflammation, the fistula will evidently have less tendency to cicatrize. Eugenie Denis, 17 years of age, without the catamenia, was admitted into the Hospital of La Pitié, on the 18th October, 1833. From the age of 7 or 8 years this patient had been subject to colic and vomitings. After renewed attacks of colic, a painful tumor made its appearance at the umbilicus. An incision was made, when there was discharged a dark-colored and exceedingly fetid liquid. A month subsequently a natural opening was formed below and to the right, and about the beginning of December four others were established around the first. At the autopsy, both lungs were

found filled with tubercles, and some patches on the intestinal peritoneum also contained them. Besides ancient cicatrices, there were found also four ulcers in the small intestine. One of them situated in the ileum opened into an ancient false membrane, transformed into a canal more than an inch long, and in this manner reached the abdominal parietes a little above the left inguinal ring. It was by this route that the matters had become effused from below upwards, and from the left to the right, in order to reach the umbilical region, where they resulted in the stercoal abscess. In this girl, the species of accidental funnel, which had formed between the intestine and the wall of the belly, would very probably have rendered the cicatrization of the passage impossible, even though there had been no other complication. Nor was there moreover the slightest appearance of eperon opposite to the abscess. Also, she had continued to have her stools from time to time. I had at the same time at the hospital, a boy named Castin, 17 years of age, who had a fistulous ulcer on the right side and a little below the umbilicus, and from which there was a daily discharge of a certain quantity of the contents of the intestines together with gas. This ulcer had already existed three months and had been preceded by an enormous abscess. The patient, who although meagre and puny, had a good deal of vivacity, and was never without more or less regularity in his stools. No other organ was found in a state of disease either by M. Louis or myself. The probe took the course towards the iliac fossa at three inches below, and to the right of the external fistula. I laid open the whole of this track in order to establish a complete parallelism, between the perforation of the intestine and the external wound. This wound being dilated at a subsequent period by means of a cone of prepared sponge, enabled me to penetrate with the finger into the interior, and to recognize there all the characters of the cæcum and of the ascending colon.

Quite a remarkable phenomenon, moreover, and which we have frequently seen, was this, that at the same time that we could readily make the injections pass through the artificial anus, we also saw the ingesta by the mouth reach there almost with the same promptitude. However this may be, this fistula, which allowed the patient to have a natural evacuation whenever it was kept closed up by means of a plug of linen, lint, sponge, or even cork, was transformed into an actual artificial anus as soon as the plug was removed. There was no eperon behind. To effect its cure I made use of every description of remedy; and the simple and quilled suture, and anaplasty repeated three times all completely failed. A small valve which I recognized at the bottom of the cavity, was removed by means of the enterotome of Dupuytren, without any advantage being thereby produced. Finally, this young man, who left the hospital in March, 1834, and in other respects enjoyed sufficiently good health by his habit of shutting up his fistula with a plug, and whom I again saw at La Charité on the 15th July, 1836, died of phthisis in 1837. The perforation communicated with the large intestine, and the speedy discharge of the alimentary matters was explained by a noose of small intestine adherent to the cæcum or colon, and which opened there, on its side, by means of an ulceration. In whatever manner

we consider this fact, it must, however, be nevertheless ranked among cases of artificial anus which persist notwithstanding the absence of an eperon.

*c. Artificial anus in which the eperon has been destroyed.*—Many persons would suppose from the writings of Scarpa and most modern surgeons, that after having removed the eperon of any artificial anus the cure is almost certain. Nothing, however, is more incorrect, and the following is what Dupuytren himself thinks of it. From eight to ten days only, he remarks, are required for the enterotome to produce its effects. “The stools generally become regular in about the same time, but weeks, and even sometimes several months are required to effect a complete obliteration of the abnormal opening. Sometimes, even, it has been found impossible to accomplish this effectually, even though when reduced to the smallest dimensions this had become unnecessary, as it could be kept closed for a long space of time without allowing the egress of the slightest quantity of stercoral matters. To this obstinate resistance of an opening, which thus exists without any apparent cause, we have successively opposed, and it must be confessed without much benefit, colophane in powder introduced into its cavity, cauterization of its borders with nitrate of silver, and their approximation effected and maintained by means of adhesive palsters, finally the excision of these same borders which were formed by the skin and mucous membrane, and afterwards their accurate coaptation by means of the quilled suture.” When we reflect that an artificial anus whose eperon has been destroyed is placed in nearly the same conditions as an anus or fistulas from ulceration, or without displacement of the intestine, we soon cease to participate in the surprise of Dupuytren. We soon, on the contrary, ask ourselves the question, why a cure should be so frequently accomplished in the first case while it is so rare in the second. This is a difference which I have endeavored to discover the cause of, and which I explain in the following manner: if the fistula or artificial anus is established without an angular displacement of the intestine, there is no membranous funnel formed. But experience shows that an artificial anus without this funnel is cicatrized with extreme difficulty. Scarpa even goes much farther: “Artificial anus is always incurable,” he says, “when it is formed in consequence of a wound penetrating into the abdomen, attended with protrusion of the intestine, whether a part of this canal has been destroyed by gangrene, or whether it has been partially or totally divided by the wounding instrument.” He afterwards adds: “Umbilical and ventral hernias almost always give rise to an incurable artificial anus when they pass into gangrene.” This, in fact, is because there is then no hernial sac which admits of being drawn into the belly by the adhesions of the intestine, in such manner as to constitute the membranous funnel so well described by the Italian author. It now remains to ascertain if an anus which persists, after the destruction of the eperon, might not be ranged under the same head. Those cases of artificial anus which are produced by hernia attended with gangrene, do not always necessarily lead to the formation of a membranous funnel. I am even disposed to believe that this funnel is quite frequently wanting. The adhesions of the sac in the track

or upon the periphery of the hernial openings are sufficiently solid, in a great number of cases, especially when the hernia is congenital, to resist the tractions made by the mesentery and to prevent the intestine from being carried to any great distance posteriorly. The destruction of the eperon, therefore, evidently places the intestine in the same conditions as if the anus had been formed by an internal perforation, or without previous displacement. It is very natural, therefore, that in other respects the cure should be as difficult in one case as in the other. It is even probable, under such circumstances, that after the exsection of the eperon, an artificial anus, in the condition of a fistula, will not heal up unless it is by a species of peritoneal duct or membranous funnel which has become established between the perforation of the intestine and the external opening. To those who would object that an artificial anus, without displacement or pre-existing hernia, will sometimes close up spontaneously, though there may have been no membranous funnel there, I would answer, that upon this point Scarpa has again gone too far. The third case, in a memoir inserted elsewhere, (*Journ. Hebd.*, 1836,) shows us, in fact, that this funnel is possible after umbilical hernias; and we see by the tenth case, that the same may take place after intestinal ulcerations, proceeding from within outwards, (excentrique;) only that it is to be remarked, in such cases, that it is a false membrane which has become organized and transformed into a canal, and not the peritoneum, which yields or is elongated into a funnel; but it is easily perceived that this difference is altogether to the advantage of the accidental funnel. Thus, on one hand, the artificial anus without displacement of the peritoneum, appears to require for its cure an accidental membranous canal, which approximates it in character to the artificial anus, properly so called; while on the other hand an artificial anus with a hernial sac would, if it persisted after the destruction of the eperon, resemble the anus without displacement, by the absence of a membranous funnel. Considered in this point of view, the question appears to me to be very simple. It enables us to range every kind of artificial anus that have no eperon into two classes, those that are accompanied with a canal or membranous funnel, and those that are destitute of this complication.

*d. Treatment of artificial anus destitute of an eperon.*—Those cases of artificial anus that belong to the first class generally cicatrize very well when they are not kept up by a vitiated state of the constitution, nor by an organic lesion or any local complication, such as sinuosities or separations of the skin, or folding or contortion of the intestines, abnormal adhesions, &c. On the contrary, it rarely happens that those of the second class do not obstinately resist the means usually employed against them. Now it is especially to the treatment of these last that the following remarks are applicable.

*I. Cauterization* and styptics are evidently only auxiliary means, which are incapable of succeeding by themselves except in cases of very small fistulas or where the anus has a tendency to close up of its own accord.

*II. Anaplasty*, at first sight, appears to offer a better prospect of success. I have made trial of it in three different ways.

a. In one instance I detached the integuments to the extent of an inch all around the wound, in order to be enabled to abrade and approximate its borders with greater facility and to reunite them by means of the suture. The stercoral matters soon extravasated between the detached integuments and the other tissues, notwithstanding the compression which I had thought I could use as a precaution against this accident. It became necessary to remove the points of suture on the third day, and the wound was now found larger after the operation than it was before.

b. In another instance I cut out above the ulcer a flap which I attached in form of an operculum by means of the suture to the periphery of the fistula, which had been previously abraded. On the second day we noticed a yellowish exudation and bubbles of air escaping from between the points of the suture, followed by gangrene, which invaded the flap, progressing from its borders to the pedicle. M. Blandin, however, (*Acad. Roy. de Méd.*, 1838,) in operating since upon a patient by this process appears to have obtained from it complete success.

c. The species of plug (*bouchon*) which I had successfully employed for shutting up laryngeal fistulas, still presented itself to me as a last resource. I borrowed it from the flank, and after having turned it back and doubled it upon its epidermic surface, I inserted it in the ulcer and retained it there by means of four points of suture. An exudation of stercoral liquids took place on the following day. The suture had cut through the borders of the fistula and mortification of the flap took place as in the preceding case. The *quilled suture*, moreover, without any previous dissection of the integuments, had been the beginning of all these difficulties.

d. I thought I could perceive in fact in these cases that there were two difficulties to overcome, one which was imputable to the acrid or putrescent character of the intestinal matters, and the other which was caused by the induration of the neighboring tissues. Though saliva, tears, serosity, synovia or even urine may pass through or become temporarily lodged between two points of suture, the cicatrization nevertheless will take place, provided the contact of the lips of the wound has been correctly maintained. This is because a solution of continuity touched, en passant, by any of these matters is not on that account rendered much less incapable of the process of agglutination. The stercoral matters cause an entirely opposite condition of things; even the slightest particle of these, if it has become lodged between the borders of the wound, will prove sufficient to destroy the tendency to adhesion, and will expose the surfaces which have been lubricated by it to the risk of mortification. The different kinds of sutures will always find from these difficulties a serious impediment to their success.

e. Fistulas in general, and especially a stercoral fistula, rarely continue for the space of a few months without becoming callous. Its periphery is transformed into a hard inodular tissue, which ultimately resembles a sort of inorganic ring which is but little favorable to cicatrization, either by first or second intention. A flap of pliant tissue borrowed elsewhere and dissimilar in texture will not agglutinate to it. To maintain its borders in contact it is necessary

to make the suture exercise such powerful and continued tractions that it must soon cut through a tissue so dense and so *easily divided*. Finally, it is almost impossible by the ordinary processes that the approximation upon the intestinal side can be made sufficiently exact to escape from the danger of every kind of infiltration of stercoral matters.

III. *New Method.*—I had arrived at this stage in the above difficulties when there came to La Charité a young man whom M. Auzoux had sent to me from Normandy. This boy was nearly in the same condition as the young Castin. Before proceeding in his case to any kind of anaplasty, I resolved upon making trial of the simple suture by the process of M. Raybard, that is to say, to include in the nooses of the thread a piece of caoutchouc or pliant wood inserted in the intestine behind the wound, in order to prevent all communication of the interior with the exterior, or to proceed to a relaxation of the abdominal walls by means of two lateral incisions. I commenced with this last process, with the intention of having recourse promptly to the other in case of its not succeeding. The operation was performed on the 15th November, 1835. The celebrated Dr. Mott was kind enough to aid me as an assistant. I embraced the entire fistula in an ellipse, in order to excise it by a double semilunar incision, but one which was to divide obliquely from the sides to the centre, and in such manner as not to include in it the intestine or at least not its mucous membrane. I then inserted four points of suture at a distance of two lines from each other, taking care that their middle portion did not reach as deep as the abdominal cavity or the intestine. It was at this point of the operation that I made on each side, at the distance of twelve to fifteen lines external to the wound, an incision two inches long, comprising the skin, subcutaneous tissue and aponeurosis of the obliquus externus. The parts being all washed and perfectly cleansed, I now knotted the threads and placed a cylinder of lint in the lateral wounds in order to keep their lips apart before proceeding to apply the containing dressing. On the 18th the matters had accumulated to such extent that it became necessary to cut the threads. The operation therefore appeared to have failed; the borders of the wound were washed and the patient recommended to keep them in as clean a condition as possible, while he was kept upon a nourishing diet, but restrained as to quantity. On the 30th December the wound was no longer attended with any discharge except a very small quantity of purulent matters; on the 4th January, 1836, there was no longer any discharge of faeces, and the patient was in a very satisfactory condition. He was kept sometime longer at the hospital in order to be certain of his cure. As nothing presented itself that gave rise to any apprehensions, and as the patient walked with ease and was without any pain whatever, he was discharged on the 8th February. It is difficult to form an idea of the relaxation which is obtained from lateral incisions under such circumstances. The abraded lips of the fistula will then almost come in contact of themselves. There is no longer any necessity of tightening the suture but in the most gentle manner; but it is requisite that the incisions should be long and deep in order to attain this double object. The fistula abraded in the manner I

have mentioned, is transformed into a species of cup, the bottom of which is perceptibly of less breadth than its mouth. It results from this, that we do not put its cutaneous portion in contact without forcing also its intestinal portion to close up completely. The threads not penetrating as deep as the intestine, prevent on the other hand the intestinal matters from having any opportunity of insinuating themselves into the track of the sutures. It is probable moreover, that so far from compressing the belly and the wound in the manner I have done, it would be better to leave them entirely free. A rigid diet with repose, with a laxative injection every evening, during the first eight days, would also certainly be more advantageous. I am induced to believe that the accidents which came on on the third day would not have taken place if I had paid attention to these circumstances. Thus in artificial anus without an eperon : to remove the inodular tissue while respecting the deep-seated or intestinal periphery of the fistula ; to insert the threads without going as deep as the intestine ; make a long incision the distance of an inch or two on each side ; dress without compressing the belly ; and administer a laxative every evening and restrict the patient to a diet ; such, in a few words, is the method which I propose, one which is in reality worthy of being made trial of whether by itself or in combination with it the various descriptions of anaplasty which I have already employed.

[*Enterotomy to establish an artificial anus in cases of obliteration or destruction of the small intestines*, as first recommended by Louis in 1757, and first successfully performed by Renault of Joinville, in 1787, was also recently performed with entire success by M. J. G. Maisonneuve of Paris, (see this case, *Arch. Gén. de Méd.*, Dec. 1844, 4e sér., t. VI., p. 174.) In a subsequent memoir, (*Arch. Gén.*, 4e sér., t. VII., April, 1845, pp. 448–466.) this surgeon returns to the subject and boldly advocates the propriety of recurring to this operation in cases where the effectual interruption to the progress of the intestinal matters and a complete state of strangulation is clearly established, whether from a foreign body, formation of fibro-cellular bridles or other abnormal growth in the tube, or by invagination, or from contraction of its calibre, (sometimes the result of adhesions and cicatrices following ulcerations of the gut after its return in operation for hernia,) or its entire obliteration, whatever the cause may be ; provided enteritis has not taken place or that the alarming symptoms, tympanitis, stercoral vomitings, &c., have not resulted in gangrene. M. Maisonneuve does not recommend the operation but in extreme cases, and as the only chance to save life. He is aware of its dangers and difficulties, and of the comparatively half-digested condition of the aliments which afterwards have to be expelled from the artificial opening before they can have possibly supplied essential and proper nutriment to the blood. This he would endeavor to remedy by generous food, and where there is proof that the interruption in the tube is removed he advises the anus to be closed ; for, strange as it may seem, his experiments on animals establish the fact that the continuity of the alimentary canal, after having been completely obliterated by one or more ligatures, has by means of an artificial anus kept open during the time the threads were cutting their way

through the intestinal coats, been again re-established so that the food has resumed its natural course, thereby enabling the surgeon to close up the artificial opening. This gradual *affrontation* and agglutination of the divided circular edges of the tube, in proportion as the ligatures are ulcerating their way through it, is a remarkable fact in physiology, and goes to justify the performance of an operation which might in some measure imitate the process of nature. This has been but feebly carried out, however, in the few and fatal attempts hitherto made in what the French call *adossement* of the intestines, that is, a complete exsection transversely of the strangulated portion of the gut and afterwards the restoration of the continuity of the canal by invaginating the end of the upper over that of the lower portion of the gut, &c. [See the text of M. Velpeau above.] This process M. Maisonneuve also approves of as it would seem, but inclines, we should judge, to the only one he has described, viz: the construction of an artificial anus externally. If the fact he states of ligatures upon the gut in dogs be exact, the reparative process here resorted to by nature should be as exactly imitated by art as possible. But how to do this? How to institute this gradual, slow, certain and sure process of successive, minute ulcerations, granulations and agglutinations? The author considers that the tympanitic, distended, small intestine above the strangulated part may be diagnosed and distinctly recognized in its form and course, as M. Laugier had suggested, provided peritonitis has not taken place, the evidence of which latter will be contradistinguished by the general tense condition of the abdomen, rendering it impossible any longer to detect or even to reach with the touch the convolutions of the gut underneath the inflation. M. Maisonneuve says truly that the artificial anus should be as far from the stomach as possible; and that in most cases, avoiding meanwhile too much fingering and searching, (so often a source of fatal mischief,) we may, after the operation, know by the more frequent recurrence of the valvulae conniventes, felt through the coats of the intestine, that we are approaching the pylorus, whereas when they are farther apart we are on the ileum. He considers this an important point in the diagnosis for fixing a locality to the new anus to be opened by a slit into the gut.

*Gastrotomy and establishment of an artificial anus, successfully performed for constipation; also gastrotomy successfully performed for constipation from intussusception.*—Gastrotomy was successfully performed by Dr. J. C. Manlove, (*Northern Journal of Medicine*, January, 1846; *Boston Medical Journal*, July 23, 1845; *Proceedings of the Tennessee State Medical Society*), on a colored boy 17 years of age. When Dr. Manlove first saw him, (July 7, 1844,) he was suffering under some general uneasiness of the abdomen and fever, and had been constipated for twelve or fifteen days. Bleeding ad deliquium, and every kind of purgative and injection almost had been employed without effect. On the 10th of July, the abdomen becoming enormously distended, with difficulty of breathing, cold extremities, feeble, quick pulse, anxious countenance, and no evacuation, the surgeon decided upon gastrotomy, and the operation was performed by an incision on the median line from two inches below the umbilicus to the distance of four or five inches

towards the pubis. The peritoneum and bowels along the lower half of the incision were found in an intimate state of adhesion, and in cutting through the former, an opening of about one fourth of an inch was made into the latter. This opening, which appears to have resulted from a want of proper care in the dissection, proved a fortunate accident. Large quantities of flatus and liquid fæces, and some oil of turpentine, which the patient had taken, were immediately discharged from it. On further examination, it was found that the intestines were united to the peritoneum by extensive adhesions at various points within reach of the finger and probe. The wound was closed by sutures and adhesive straps, except the opening into the intestine. The amendment of all the symptoms in the course of an hour was astonishing; the extremities became warm, the pulse slower and fuller, and, during the morning, the patient was enabled to fan himself, the weather being excessively warm. On the next day the appetite was good, and he continued to discharge the contents of the alimentary canal through the artificial anus, until the seventeenth day after the operation, when the bowels acted naturally, as the opening had nearly closed. The patient, it appears, had received an injury to the abdomen six months before, by the falling of a piece of timber. The boy was well nine months after the operation, and exhibited to the society. The reporter, in adverting to the operation under similar circumstances, quotes a case of Dr. Wilson, (also of Tennessee,) viz., that of a negro man supposed to be laboring under intussusception, with obstinate constipation, which had resisted every remedy used. Dr. Wilson then performed the operation of gastrotomy, and drew the intestines out of the abdominal cavity, until he came to the point where the obstruction existed. About one inch of the ileum was found to be invaginated and closely united by adhesions to the receiving portion. These were dissected loose, and the bowels returned. Natural passages immediately took place, and the patient was rapidly restored to perfect health. It is curious in the above cases, especially in the first, to note the salutary efforts of nature in forming protecting adhesions. In the first, the way was thus completely prepared for an artificial anus, and all danger of infiltration of fæcal matter into the abdomen or its parietes avoided.

M. H. Nunciante is alleged to have succeeded with intestinal suture in *three instances*, (M. Jobert, *Arch. Gén. de Méd.*, Paris, 4<sup>e</sup> sér., t. IX., Oct., 1845, p. 346,) by a sort of *spiral* or *whip* (i. e., the *glover's*) suture, which by drawing on the two ends of the thread in opposite directions, brought the intercepted portions of the stitches in such manner as to place the *serous surfaces* of the intestine in contact, a point of great importance, and perhaps the only principle upon which we can reasonably hope for agglutination. [See text above.]

The Editors of the *Archives Générales de Paris*, (4<sup>e</sup> ser., t. X., March, 1846, p. 337,) remarking upon a case of contracted colon in an adult man aged 23, in which Dr. Evans, (*London Med. Chir. Trans.*, vol. XXVIII, 1845,) in consequence of obstinate constipation, stercoraceous vomiting, and various enteritic symptoms, decided upon making an artificial anus, by opening into the colon through the right lumbar region; assert, that this is the *eleventh* time, as they think, in which Callisen's process, as modified by M. Amussat, has

been performed. Although the digestive functions were in this instance partially ameliorated, death ensued at the expiration of two months, from a violent enteritis, showing that this operation (as the other cases corroborate) does not cure the patient, or at least establishes a disgusting infirmity in place of the original disease, and is not therefore justifiable, but in an extreme case of dangerous obstruction, as in the patient under consideration, and where death must otherwise have inevitably ensued ; the operation under such circumstances presenting the only chance, which, at best, is but a bad one.

*Enterotomy for Cancer of the Colon—Exsection of a portion of the Colon, and cure !*—A cancerous tumor occupying the two posterior thirds of the sigmoid flexure of the colon, occurring in a man aged 28, and accompanied with lancinating pains, colics, and much distension, was, according to a statement transmitted by M. Reybard of Lyon, to the Paris Royal Academy of Medicine, but not considered by them sufficiently detailed, (see *Arch. Gén.*, Aout, 1844, 4e sér., t. V., pp. 516, 517,) successfully removed by him by cutting down to the tumor, and exsecting it, together with a transverse segment of three inches of the colon, and then uniting the two ends of the gut by the *whip suture*. The cure he says was *complete* on the thirtieth day ; if so, it was almost the first, if not the only case of cure by enterotomy and *adossement*. But in six months the cancer returned and the patient died !

*Voluntary Enterotomy and Exsection of seventeen inches of Intestine !*—The case related by Dr. Brigham, physician of the New York State Lunatic Asylum, in which it is stated, (*American Jour. Med. Sc.*, April, 1845,) that a female lunatic, who was a married woman, and had had five children, during the previous two years, suddenly made, in June, 1843, two wounds in her abdomen near the umbilicus, with a large scissors, and tore out and cut off, that is, *exsected a portion or segment of intestine, seventeen inches in length*, which was laid aside and preserved, while the remaining ends were returned into the belly, and produced no pain or uneasiness or inflammation afterwards, but united and healed up internally and externally, followed by the restoration of the canal and natural discharges, and complete recovery of health, were it not for the high character of Dr. Brigham, would on its very face be too marvellous to notice in this work. All that we can say is, that it is one of those narrations which defy all comment. [See text of M. Velpeau, supra.]

*The Colon opening into the Stomach.*—A remarkable case is given, (*London Med. Gaz.*, May 2, 1845,) of a woman aged 64, who, after the continuance of a protrusion at the umbilicus for five years, had an abscess formed there, which ultimately caused a perforation and adhesion of the left part of the arch of the colon at its median line with the stomach, whereby faecal matters were vomited up from the latter, and ultimately caused death.

*Perforation of the Ileum—Adhesion of the Omentum, &c.*—A remarkable case is related by Dr. W. O. Mackenzie, Dragoon Guards, Canterbury, Eng., of a soldier, aged twenty-six, who had been intemperate, and who had no other symptoms than moderate pain in the lower part of the abdomen, chiefly on the *left side*, and obstinate diarrhea, *without tenesmus*, and more or less tympanitis,

ending in exhaustion and death. He found on dissection that the great omentum was of a bright pink color, and lower on the right than on the left side, notwithstanding the seat of the pain was on the latter. The omentum on the right side, which seemed to be gathered into a knot above the small intestines, was found closely adherent to the ileum, two and a half inches above its entrance into the cæcum; and in the absence of the three coats of the former intestine ulcerated at this point, it formed the only impediment to the entrance of the fæces into the cavity of the abdomen. This perforation was of the size of a fourpenny piece. At the same point, firmly adherent in its whole length, was a large gland of the exact shape, but rather larger than an ordinary kidney. It was of cartilaginous consistence, resisting the edge of the knife; it was in the centre of a purple color, but yellowish white in the other parts, and it weighed nearly four ounces. The stomach was so much contracted as to be concealed behind the liver. Peyer's glands were found unusually numerous and distinct in the ileum, and about sixteen or eighteen inches from its termination were marks of subacute inflammation. At its junction with the omentum it was enlarged and very much ulcerated, and diseased until its entrance into the cæcum. Here the appendix vermicularis presented a singular appearance, being of the ordinary size of the duodenum, from the great thickness of its parietes; it was nine inches long, pervious throughout, filled with fæces, and had a similar appearance to that described in the ileum. Along the whole of the colon, traces of inflammatory action were well marked, but least so towards the sigmoid flexure. The kidneys were of the usual size, but of darker color; the mesentery very thick, no where less than a quarter of an inch, besides being incapable of being separated into different layers. Imbedded in it were many enlarged glands, varying from the size of a nut to that of a pigeon's egg.

The disease, Dr. Mackenzie properly thinks, must have been of some years' standing. The seat of the *pain*, as compared with the morbid appearances, shows how perfectly misled one may be in the diagnosis, and thus makes the case, in this respect as well as in others, of much value. How nature, secretly at work within, makes her own anaplastic reparations by these omental adhesions, recalls what is seen in some hernias, and also in the cases above. These cases of *pathological anatomy* in regions with which surgery has so much to do, especially at this present epoch of the ovariotomy mania for cutting into the abdomen, as well as into the scalp, &c., without rhyme or reason, become exceedingly interesting, and show with the thousand other proofs how absolutely essential for correct and profitable post-mortem examinations are ample bedside details of the phenomena before death, and how necessary a previous history of the symptoms during life, are to the establishment of a sound and legitimate therapeutic. The enlargement of the *appendix vermicularis* in this case, says Dr. Mackenzie, was much greater than anything I have ever seen before. I believe the use of this structure has not been ascertained. When I found, he adds, the cæcum quite loaded with thin fæces, and the appendix vermicularis immensely enlarged, lengthened, and also distended with feculent matter, the idea struck

me that it acted as a sort of reservoir, to prevent too great pressure against the ileo-cæcal valve, whose use is to prevent regurgitation into the ileum. Is such a supposition irrational? We should answer not, but that it is undoubtedly a true one as to the uses of this singular appendage.

We should wish to correct one remark however, which we think must be an error in Mr. Irving, who first attended the patient, and who, mentioning that his tongue was red, says it was very similar to what he had seen in *dysenteric* patients in the West Indies. Now Mr. Irving probably alludes to all cases of continued exhausting *diarrhea* like that of the above case, and which *diarrhea without tenesmus*, as in the case above, and totally distinct from dysentery and from all its complications, is marked not only in the West Indies but elsewhere, by that peculiar *vermilion redness of the tongue* (from the erythema of its papillæ) and in fact of the whole mucous lining of the mucous passages, which is seen also in the last stage of *yellow* (not remittent or intermittent) *fever*, and in the last stage of *phthisis*, &c. T.]

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## CHAPTER II.

### HERNIA IN PARTICULAR.

#### ARTICLE I.—INGUINAL HERNIA.

Tumors which protrude above Poupart's ligament, between the antero-superior spinous process of the ilium and the outer border of the lower tendon of the rectus muscle, receive the name of *inguinal hernia*, when they are formed by the displacement of some of the viscera through this portion of the parietes of the abdomen. When we consider the inguinal wall at the interior of the abdomen, we readily perceive that it is divided into three secondary cavities; one which comprises the posterior opening of the canal, and is insensibly prolonged to the spine of the ilium, the second which separates the epigastric artery from the remains of the umbilical artery, and the third which is found between this last mentioned artery and the termination of the outer border of the rectus muscle. As hernias begin at one of these three depressions, it has appeared to me advisable to designate each by a special name. Thus, the first may be described under the title of the *external inguinal fossa*; the second, under that of *middle inguinal fossa*, and the third, under the name of *internal or vesico-pubic inguinal fossa*.

#### § I.—*The various forms of Inguinal Hernia.*

The external fossa is evidently the point which presents the least obstacle to the viscera; it is by this therefore that hernias must take place with the most facility; so also are they the only kind to

which the attention of surgeons was directed up to the beginning of the present century. They are known at the present day under the name of *external inguinal hernia*, a name which Heister formerly applied to crural hernia. When the intestines become lodged in the middle fossa, the hernia takes the name of *internal inguinal hernia*, as given to it by Hesselbach. If they make their escape through the *internal fossa*, an example of which has been seen, as it would appear, by Wilmer, M. A. Cooper and M. Goyrand, (*Lancette Franc.*, t. V., p. 478,) the name which would be proper to apply to them would be *supra-pubic*. These various kinds of hernia, presenting characters and anatomical relations differing from each other, require each of them a separate examination.

A. *External Inguinal Hernia*.—The arrangement in external inguinal hernia is in general easily understood; the viscera pushing the peritoneum before them, become lodged in the inguinal canal at its posterior opening, then pass through its entire length, and then make their escape finally through the ring of the *externus obliquus abdominis* muscle, in order to descend subsequently into the scrotum. When arrived at this condition, the hernia is complete, but it may present itself under other forms.

I. *Supra-inguinal evagination*, (*éventration*).—Thus we find, in many persons, that the external inguinal fossa allows itself to be relaxed and distended to so great a degree that the abdominal organs, in pressing upon it from within outwards, protrude it above Poupart's ligament, under the form of a large border, which sometimes assumes several of the characters of a true hernia. In these cases, no organ having yet in fact entered into the inguinal canal, and the posterior opening of which has not yet given way, the hernia is incapable of strangulation; it occasions only a degree of uneasiness and weight which are annoying to the patient, and which we may find it necessary to relieve by means of a bandage.

II. *Incomplete Inguinal Hernia*.—In other persons the displaced organs reach as far as to the external orifice, but do not escape from it, and continue there in the form of a species of cylinder or mass in the interior of the canal. This is a description of hernia which has specially occupied the attention of surgeons in our epoch, but which nevertheless had been noticed by several authors in the last century. J. L. Petit, Lecat, Murray and Callisen, appear to have clearly described it. Scarpa cites a case in which it was strangulated. Boyer, who calls it *intra-inguinal*, does not consider it as very uncommon. M. A. Cooper and M. Key, carefully describe several instances of this hernia. M. Dance also gives three cases, and M. Goyrand has made it the subject of a special memoir. It has also been designated by the name of *intra-parietal* and *inguino-interstitial*, but it seems to me that that of *incomplete inguinal hernia* is more suitable to it than any other; it moreover presents itself under various forms which must not be neglected.

*First variety*.—In some cases it occupies exclusively the inguinal canal in the shape of an elastic cylinder, which in the manner of a border extends from the neighborhood of the pubis as far as into the iliac fossa and towards the corresponding spine. I have seen an example of this kind.

*Second variety.*—In other cases the tumor acquires so large a volume in the canal, that it is obliged to ascend into the substance of the walls of the belly under the form of a globular mass, or of a plate more or less flattened. It is to this description of hernia that M. Dance has given the name of intra-parietal, under the impression that he was the first who had noticed it, and with the intention of making it a new species.

*Third variety.*—In other cases again, a portion of the displaced organs escape through the external ring, while the other portion remains in the canal. The parts were in this condition in a case mentioned by M. Key, and also in another noticed by M. Lawrence. In such cases the hernia is generally an entero-epiplocele; the epiploon is prolonged externally, while the intestine remains within. This was the arrangement in the case of an adult man whom I operated upon with Dr. Nicault in 1837.

*Fourth variety.*—In certain cases the hernia I am describing is caused by the imperfect reduction of an oschoecele or bubonocele, either during the usual taxis or in the operation for strangulated hernia.

III. *Hernias through abnormal openings.*—It is also possible, in external inguinal hernia, that the intestine, whether situated outside of the posterior ring or in the interior of the canal itself, may make its escape through a *rent in the aponeurosis of the external oblique*, in place of passing through the external ring, properly so called. This modification of hernia, the possibility of which is even contested by many authors, is at the present day, in my opinion, a fact which has been completely demonstrated. It is even surprising that its existence should have been called in question, when we reflect upon the facts and observations which have been related, and upon the manner in which it takes place. An attentive examination of the inguinal region will soon make it evident that both in the fascia transversalis and in the aponeurosis of the obliquus externus, there exist two orders of fibres which, by intercussating each other, form actual diagonal apertures, (losanges,) so much so, that the external inguinal ring itself is no other than the largest of these apertures. It is therefore very natural, that if from some anomaly the ring should be found more contracted than usual, or if some other of these apertures of intercussion should be found wider, the viscera would rather make their escape through this than through the ordinary track. I would also remark that inguinal hernia, through a rent in the aponeuroses, presents several varieties. It may in fact take place through the external inguinal fossa and outside of the posterior ring, or through the anterior wall of the inguinal canal itself. I have seen two instances of the first of these varieties. A student of medicine noticed in his groin a globular tumor of the size of a large nut. It was situated half an inch outside of the ring; the fibrous opening was found immediately above Poupart's ligament, and upon a line with the crural arch. The extremity of the little finger could be readily introduced into it, and it was easy to follow the spermatic cord as far as the interior of the inguinal canal, and in this manner to ascertain that the two orifices were perfectly independent of each other. The second case occurred at the beginning of the year 1837,

at the hospital of La Charité. The tumor, which was of the size of a small pullet's egg, was situated above Poupart's ligament, at an equal distance from the antero-superior spinous process of the ilium, and from the ring of the obliquus externus, in which last I could easily introduce my finger, while I held my thumb on the abnormal orifice.

M. Blandin relates an instance which is still more conclusive, since it was demonstrated in the opening of the dead body; a fibrous bridle two lines in breadth separated the neck of the hernia from the posterior ring of the inguinal canal. When the organs have already entered into the canal they may make their exit in the same manner. J. L. Petit relates that he saw a hernia which escaped in this manner, through a rent in the external border of the ring, (pilier externe.) Arnault mentions a patient who had at the same time two hernias, one crural, and the other a little higher upon the side of the ring, and both of which were only separated by a small fibrous bridle. A case of the same kind has been more recently met with by M. Roux. It is well to add, that in a case which M. Laugier showed me, the intestine, after having made its escape through Gimbernat's ligament also took the character of a hernia of this description. It is also to be remarked, that according to certain facts related, hernia, by means of a rent may also take place through the inner border of the ring (pilier interne), either directly through the middle inguinal fossa, or through the interior of the canal itself. J. L. Petit relates an example of this kind, and another is found in the treatise on bandages by Juville; but a sufficient number of details are not given to make these facts conclusive. Whatever, however, may be the form of external inguinal hernia which shall present itself, it will always have the epigastric vessels on its inner side; whether it be complete or incomplete it will, nevertheless, be found accompanied by the close proximity of these vessels at its lower and inner semi-circumference, provided it has entered by the posterior opening of the canal; but it is readily perceived that in hernias which protrude at the outer half of the external inguinal fossa, there may exist a considerable space between the epigastric vessels and the neck of the hernia. When any organ whatever protrudes from the belly into the interior of the inguinal canal, it will almost inevitably be found situated above, and to the outside of the spermatic cord, so long as it has not yet made its escape through the external ring. Up to that point the relations of the hernia with the canal which it traverses, are altogether of a peculiar character, whereas afterwards they are nearly the same as in the varieties of hernia which remain to be described.

B. *Internal Inguinal Hernia.*—The viscera, instead of following the inguinal canal, and of taking a direction obliquely from without inwards, or from the iliac fossa towards the pubis and scrotum, become in internal hernia lodged in the middle inguinal fossa. This form of hernia, obscurely mentioned by Camper, and described by Cline in his public lectures about the middle of the last century, and which, notwithstanding, has only been recognized in the character of a distinct species of hernia, since the labors of Hesselbach, is still designated under the epithet of *direct inguinal hernia*, or of *ventro-*

*inguinal hernia.* Pushing before it the fascia transversalis, which it sometimes lacerates between the epigastric artery on its outside, and the cord of the umbilical artery on its inside, it has a tendency from the beginning to force directly in front of it, and through the external ring, the posterior wall of the inguinal canal. In this hernia the spermatic cord is situated to the outside, afterwards posteriorly, or rather it does not contract any absolute relations with the hernia until at the moment when the latter has become lodged in the ring of the external oblique muscle. Without being very uncommon, this species of hernia, however, is less frequent than some modern authors seem to imagine. Up to the present time no special varieties of this form have been pointed out; and in fact, unless we admit hernia which protrudes through a rent in the inner border of the ring to be one of its modifications, we can see no advantage that could be derived in investigating various forms of direct inguinal hernia. It is sufficient that it protrudes through the external ring itself, after having become lodged in the middle fossa, to entitle it to the designation under which it is generally known at the present day. As to a hernia which might be formed between the pubic extremity of the rectus muscle and the umbilical artery, it has not been studied with sufficient care even in the example related by M. Goyrand, to render it possible at the present time to furnish a detailed description of it. Anatomy only instructs us that the organ which is displaced, lacerating the fascia transversalis or pushing this latter before it, would not arrive at the external ring, except by taking the direction of a line which would extend obliquely from within outwards, and from behind forwards, that is, a direction opposite to that of external inguinal hernia. These general relations, moreover, would differ but little from those of inguinal hernia which takes place at the middle fossa. There would be no difference between them in this respect, except that the epigastric artery, which runs on the outer side of internal inguinal hernia, would probably be found at the distance of a few lines from supra-pubic hernia.

C. *Hernia of the Tunica Vaginalis.*—Inguinal hernia, leaving out of consideration the aponeurotic canal that it traverses, presents still another variety, which it is important should not be confounded with those above; this is the hernia which is called congenital, because some infants have it at birth, and especially because it is lodged in that prolongation of the péritoneum which naturally envelopes the testicle, that is to say, in the tunica vaginalis. To comprehend correctly the difference which exists between this species of hernia, which had already been recognized by Mery, and other inguinal hernias, we must recall to mind the displacements which the testicle undergoes, in the latter periods of intra-uterine life.

I. *In the fœtus*, in fact, the testicle is at first situated near the kidneys, in the lumbar region, and covered, like all the other abdominal organs, by the peritoneum. But a bundle of fibres belonging to the obliquus internus abdominis muscle, and not a cellular cord, as has been supposed since the time of Hunter, who designated it under the name of gubernaculum testis, insensibly draws the seminal gland towards the inguinal canal. In afterwards descending into the scrotum, the testicle drags with it a prolongation of the peri-

tonium in the form of a canal, which is more or less dilated below the external ring, and which communicates with the cavity of the lower belly through the posterior ring. As this serous canal gets more and more contracted, and finally even becomes altogether obliterated, from the iliac fossa to below Poupart's ligament, and throughout the whole length of the inguinal canal, it necessarily results that in the adult, inguinal hernias, of whatever form they may be, take place upon the outside of, or on the inside or in front of the spermatic cord, carrying down with them another portion of peritoneum. In the infant, on the contrary, the hernial organs finding there a cavity already prepared, become lodged in it in such manner as to be placed in contact with the testicle itself. Congenital hernia, moreover, offers several modifications. In the most simple cases it occupies solely and exclusively the tunica vaginalis, having the testicle at its inner, lower, and posterior side. In other cases, the testicle having become arrested at the external ring, which it appears to close up, retains the viscera in the portion of the tunica vaginalis which is situated in the inguinal canal; so that the tumor is then divided, as it were, into two portions, one of which, which is a sort of incomplete hernia, and formed by the viscera, is situated in the canal, while the other, represented by the testicle, exhibits itself under the appearance of a small globular mass situated upon the external ring. Sometimes, also, the hernia gets in front, descends into the scrotum and leaves the testicle behind it; sometimes at the iliac fossa or in the inguinal canal, properly so called, or at other times at the distance of some lines only below the external ring.

II. *In the adult.*—From its title and the manner in which it is effected, it would appear that hernia of the tunica vaginalis ought not to be met with except in young children; this, however, is by no means the fact. Inguinal hernia may take place in the tunica vaginalis, and appropriate this tunic to itself as a sac, at an advanced period of life.

Science, at the present day, has in its possession a number of facts which come in support of this assertion, which I made in 1829. I have myself noticed several instances; among others, three which do not appear to admit of the slightest doubt: M. D—, a student of medicine, twenty years of age, was suddenly seized with violent pains in the groin and a desire to vomit: these were caused by an inguinal hernia which had just made its appearance and become strangulated. At the operation, which was performed on the following day, we found the intestine in contact with the testicle, and having no other sac than the tunica vaginalis. The most exact statements furnished by the mother and the patient satisfied us that the two testicles had for a long time occupied their natural position, and that no hernia had ever existed there. The tumor had rapidly acquired the size of the fist. M. D—, who was rather somewhat thin than in a state of embonpoint, was in the habit of paying much attention to everything in relation to his health. The second case presented itself in my department at the hospital of St. Antoine, in 1829; this was a wine-merchant's boy, twenty to twenty-five years of age, who, on the same morning, made a considerable effort in endeavoring to lift a pipe of liquor. Closely interrogated in

every way, he constantly replied that up to that time he never had had a rupture. This, which brought him to the hospital, was double the size of the fist, and finally rendered it necessary to have recourse to the operation. The intestine contained in the tunica vaginalis was, as in the preceding case, in immediate contact with the testicle. Death took place three days afterwards; we found on opening the body that the inguinal canal had preserved its entire length and obliquity, and that the viscera, in order to make their escape externally, had been compelled to distend to such a degree as to make a rent in, the serous prolongation of the peritoneum, which was contracted, but not entirely obliterated.

The third case of this description occurred at La Charité, in 1837. This description of hernia, one of the cases of which was published at the time, (*Journ. Hebdom.*, t. VI., p. 267,) was rejected at first as a thing impossible. But Dupuytren, to whom I spoke of it, and who at that time was also unwilling to admit it, ultimately himself met with certain instances of it. Many surgeons moreover have mentioned it, without apparently having any doubt about it. M. Roux, for example, saw a congenital hernia, which took place at the age of twenty years. In the works of M. A. Cooper, we find two facts very nearly of the same character. M. Lawrence cites a boy who was attacked with it at the age of twelve. M. Lafont speaks of an ecclesiastic of about twenty years of age, in whom the testicle had not always been situated in the scrotum, and in whom there suddenly took place an inguinal hernia, which became strangulated to such degree as to require the operation, and in which case also the tunica vaginalis formed the sac. Finally, M. Mayor has published the case of a patient aged 55, who had to be operated on for strangulation of a hernia, which had made its appearance at the age of twenty-five, and which was situated in the tunica vaginalis. To explain the formation of a hernia of this kind, we have only to admit, as Hunter and Callisen have already done, and as I myself have verified in many instances, that the tunica vaginalis remains open during the whole period of life, or at least until the age of puberty, in certain persons in the form of a small canal, and that in some others even it does not become contracted except at its upper orifice. In such cases therefore it is easily conceived that the viscera may dilate its abdominal opening, and become lodged in it in mass as in the fœtus.

III. Hernia of the tunica vaginalis, therefore, presents three varieties, which are sufficiently distinct: 1st, that which takes place in the fœtus or first years of life, and which is congenital hernia, properly so called; 2d, that which is caused by the testicle having become arrested in the inguinal canal, and thereby preventing the tunica vaginalis from closing up above, by which means the viscera are enabled to enter into it, or are even dragged into it by the testicle when it has contracted adhesions with them; 3d, that which I have just described as met with in the adult, and the predisposing cause of which is to be found in the imperfect obliteration of that portion of the peritoneum which is contained in the inguinal canal. In all these varieties, the relations of the hernia with the spermatic cord and the epigastric vessels, are in other respects nearly the same as

in external inguinal hernia, properly so called. Hey was wrong in maintaining, and I in allowing myself to adopt his opinion, that in the child the tunica vaginalis, when the hernia is not vaginal at this age, is situated in front instead of being behind or on the inside as in the adult. In fact, the tunica vaginalis is sometimes found in front of the sac in the adult, examples of which are found in the works of A. Cooper, in the same way as it is sometimes met with behind in very young children. The name of *hernia infantilis*, which the surgeon of Leeds has proposed to give to this variety, in contradistinction to that of *hernia virilis*, which he reserves for those cases in which the tunica vaginalis remains behind, would be therefore altogether erroneous, inasmuch as the two cases of MM. Hunt and Lawrence are only exceptional.

D. *Inguinal Hernia in Woman*.—The inguinal canal is not arranged altogether in the same way in woman as in man; it equally offers as in this last, a posterior and an anterior orifice, but these orifices are perceptibly of less dimensions, and the round ligament which takes the place of the spermatic cord, terminates at the supra-pubic crest, and does not extend in its totality as is generally supposed, and as I myself have elsewhere said, to the outside of the ring, to become lost upon the mons veneris, labium majus, and groin. The ligament of Nuck, which has been compared to the tunica vaginalis, scarcely reaches in woman into the inguinal canal. It is also proper to add, that the differences of obliquity in the inguinal canal in a young girl and young boy, are not perceptibly more marked than in adult age. In this respect, Scarpa and modern surgeons have allowed themselves to be deceived by theory, in place of directly consulting the anatomy of the parts. Nevertheless, inguinal hernia is quite frequently met with in women, and must present the same modifications as in man. It would even appear, though observation up to the present time is silent on this subject, that incomplete inguinal hernia ought to take place more frequently in woman than in man, to judge at least by the greater resistance that the organs meet with in attempting to enter at the apex of the labium majus. In this hernia, the anatomical relations are the same as in man, in respect to the umbilical vessels; but as the spermatic cord is wanting, and is replaced by an organ of no great importance in its texture, and which does not descend to the exterior, it is readily conceived that inguinal hernia in women could be operated upon with infinitely less danger than in man. I would add, moreover, that the character of this hernia appears to be yet very little understood in respect to its anatomical relations. Whether it shows itself from the time of infancy, or comes on at another period of life, it is not positively known whether the organs drag the peritoneum with them into the inguinal canal, or whether they are not rather, to a certain extent, drawn into that canal by a primordial serous infundibulum.

### § II.—*Parts composing an Inguinal Hernia.*

The viscera which may make up an inguinal hernia are, the small intestine, transvers ecolon, epiploon, cæcum, a portion of the descending colon, of the sigmoid flexure of the colon, or of the ascending

colon, the bladder, ovary, fallopian tube, a portion of the uterus, the spleen and stomach; even the kidney, a portion of the liver, and also, it is said, the duodenum have been found there. But the small intestine is the part which constitutes the hernia in the vast majority of cases: frequently alone, sometimes associated with the epiploon, and in a few exceptional cases with some one of the other organs just mentioned.

A. *Sac.*—The sac of inguinal hernia, though formed by the peritoneum as in all other descriptions of abdominal hernia, presents nevertheless certain peculiarities. Thus in hernia of the tunica vaginalis existing previously to the descent of the testicles, the arrangement of the sac is such that the testicle as well as the cord are found buried as it were posteriorly in the substance of the inner wall of the tumor. It descends in such cases a little below the testicle, which is found naked in its interior when we operate. If this description of hernia occurs in adults, the sac is formed by a second prolongation of the peritoneum, which does not descend below the testicle except in a few cases, and is separated from the tunica vaginalis by a septum. In women, the hernial sac, constituted in the same manner, never hardly descends as far down, and presents no peculiarity by which we can distinguish congenital hernia from the hernia of the adult at the time of the operation. An inguinal hernia, however, noticed by M. Quatreveaux (*Soc. Anat.*, 1838, 1839, p. 301,) in a woman, descended into the labium majus, and was made up of the sac and a superincumbent cyst. A similar fact is mentioned by M. A. Cooper, (*Œuvres Chir.*, French trans., p. 285.)

B. In certain cases inguinal hernia presents only *an incomplete sac*: this happens when it is made up of the bladder, the cæcum or the lumbar portion of the colon. When the bladder becomes lodged in the external ring, it is possible in fact that this may first happen at one of the points on its anterior surface which is not covered by the peritoneum. It rarely happens, however, that this cellular portion of the surface of the bladder will alone protrude from the canal, or that it does not soon draw along with it a portion of the fundus of its posterior region or a part of the side of the organ. It results from this that in the first case, in incising the tumor, we come down upon the urinary pouch without encountering the serous cavity; and that, in the second case, we come down upon a true sac or the bladder itself, according as the incision may be directed rather upon one portion of the hernia than another. The hernia of the cæcum is the one which in this respect has more particularly occupied the attention of modern surgeons. It is the only one which Scarpa is willing to consider as destitute of a sac, and the one which MM. Sernin (*Bull. de la Soc. Méd. d'Em.*, 1825, t. I., p. 377,) and Colson have brought forward in favor of their doctrine on the subject of *akystic* hernias. Here anatomy readily explains what experience establishes. The cæcum, situated in the right iliac fossa and destitute of peritoneum posteriorly, is attached there by a cellular tissue which, while making part of the fascia propria, becomes continuous with that of the inguinal as well as crural canal. This intestine, therefore, if drawn in any manner whatever towards the scrotum, may pass by degrees by its posterior wall in such manner as to

descend in this way into the scrotum, either without deviation upon its axis or by becoming turned round to a greater or lesser extent. It results from this that a hernia of the cæcum, though sometimes surrounded almost by a complete sac, is in other instances, so to speak, destitute of a peritoneal envelope. It may readily in fact be conceived that the posterior surface of the intestine will also be found to be situated posteriorly when it forms a portion of an inguinal hernia, and that if the operation is performed under such circumstances the cæcum will be contained in a serous cavity communicating with the interior of the belly. If on the contrary this intestine has become turned round while descending, it is possible that its cellular region may be found to be situated upon the inner, outer or even anterior surface; and that unless we have suspected this beforehand, or shall have from some cause or other directed the instrument upon the actually serous surface of the hernia, we might penetrate into its interior without encountering the sac. I have had occasion in the dead body to notice these two descriptions of hernia of the cæcum. In an old woman who was admitted into La Charité in 1836, with a crural hernia, and who died in consequence of the operation, we found that the cæcum was situated in the inguinal region in the same manner that it usually is in the iliac fossa. Having diagnosed before the operation that it was this description of hernia, I considered it proper to make the incision on the inner side of the tumor; but in the case in question this precaution was unnecessary, as the interruption of the sac did not in reality exist except on its posterior part. In a man who was admitted into my department at the hospital of La Pitié, in 1834, and who had an ancient scrotal hernia which had already become gangrenous at its upper portion, the cæcum on the contrary was so situated that its cellular region corresponded to all the outer and anterior portion of the tumor. It was on the inner side, and a little posteriorly, that we had to penetrate, and where, in fact, I made the incision in order to come down into the serous cavity. Another portion of the intestine also is liable to a certain extent to take on the arrangement which I have just pointed out, I mean the sigmoid flexure of the colon. It appears, in fact, that in certain cases, this intestine has got lodged in the inguinal canal in such manner as to present its adherent surface to the inner side of the hernial coverings; but the examples of this description of hernia have not up to the present time been detailed with sufficient minuteness to make it advisable to dwell any longer upon this subject.

C. The other *envelopes* of inguinal hernia scarcely vary in any other respect than in their thickness, and this according to the species of hernia which exists. Thus, in external incomplete inguinal hernia they are composed of all the layers of the walls of the abdomen. The same remark applies to complete inguinal or to scrotal hernia, except that in these the coverings are slightly modified and generally attenuated. Underneath the skin we find the superficial sub-cutaneous fascia, then the dartos muscle, afterwards a prolongation of the deep-seated sub-cutaneous fascia, after which we find the expansion of the diverging fibres or that of the cellular tissue of the aponeurosis of the external oblique muscle; then comes the cremas-

ter muscle, afterwards the fascia transversalis, and then the prolongation of the *fascia propria*, which lines the outer surface of the sac.

D. *Spermatic Cord*.—Whether the hernia be external or internal, the number of envelopes is almost always the same; but the situation of the cord may present essential points of difference. Generally it is found on the inner and posterior side, throughout the whole extent in external inguinal hernia. Nevertheless, the contrary has been several times noticed; Le Dran, and other practitioners after him are said to have found it in front. MM. A. Cooper and Key on the contrary, appear to call in question this entire displacement of the spermatic cord, and do not consider it possible that there can be anything more than an expansion of its various portions. In this respect I differ from them in opinion. Whether the hernia takes place in an adult or is congenital, it may nevertheless admit of the cord and testicle being twined round it, either from without inwards, or from within outwards, and also from behind forwards. I have, moreover, so frequently noticed the epididymis and spermatic cord naturally arranged in this way, when there was no hernia, that I should be more surprised with the rarity than the frequency of its occurrence in the case under consideration. Under such circumstances the position of the testicle, moreover, will suffice to put the surgeon upon his guard, and to point out to him the precautions which are to be taken. It is, nevertheless, easy to understand, how the cord when drawn upon, flattened and widened, may in certain cases leave the veins, arteries and vas deferens separated apart at a considerable distance from each other. It is in this way that the vas deferens especially, though situated upon the inner side at its emergence from the ring, and in front at its middle portion, has sometimes been found upon the outside of the tumor at its lower portion. In certain cases also, as noticed by M. A. Cooper and M. Goyrand, the cord, after having become expanded out posteriorly, allows itself to be perforated by the tumor in the manner of a sort of diaphragm, and afterwards takes a situation in front of and with the testicle below the hernia. In internal inguinal hernia, the tumor from passing directly through the ring of the external oblique muscle, without being obliged to pass through the inguinal canal, would rather seem to have the effect to push the cord to the outside, and posteriorly, than in any other direction. This is what in fact happens in most cases when the tumor is limited to the condition of a bubonocele. But when it descends farther into the scrotum, it is quite usual to see it cross the front part of the cord, and to find ultimately the testicle as well as the vas deferens, behind and on the inside, in the same way as if it were an external inguinal hernia. It may be easily conceived also, that this hernia, on the other hand, in place of crowding the cord backwards, might in certain cases bring it forward rather on its anterior surface, by making pressure upon it from without inwards, and afterwards from behind forwards.

E. In inguinal hernia, the *adipose layer* which I have elsewhere spoken of does not always occupy the same tissues; in patients possessing a great deal of embonpoint, it may be situated in the subcutaneous layer in such manner as to represent a border which is

more and more attenuated in proportion as it extends in the direction towards the scrotum, a border which is distinguished from hernia properly so called in this, that it is actually adherent to the skin, and is not prolonged into the inguinal canal. In other cases the fatty substance is collected into a mass, sometimes globular and at other times cylindroidal, upon the external surface of the sac, and in such quantity as to form actual tumors, which it is sometimes impossible to distinguish from epiploic hernia. These tumors, which are denominated *adipose hernias*, which have been pointed out by many authors, and which Morgagni, and especially Pelletan, have more particularly described, lead to serious mistakes in practice. Moreover, though it be true that the different descriptions of inguinal hernias when existing under their most simple forms, may be distinguished from each other without any great degree of difficulty, it must be confessed that in a great number of cases this becomes almost impossible.

F. Many *ancient hernias*, for example, have reacted upon their coverings in such manner, that they descend below the inferior extremity of the testicle, so that they no longer perceptibly differ from hernias of the tunica vaginalis. Also in such cases they may have obliterated the inguinal *canal*, brought the two openings of this passage in front of each other, and no longer present any more obliquity external to, than upon the inside of the epigastric artery. Nevertheless, it may be asserted that every inguinal hernia which exceeds the size of the head of a fœtus has been protruded at the external fossa, and traversed the whole length of the canal. Should the tumor have been prolonged in such manner as to occupy and distend the entire scrotum, it would be almost useless to seek for any other proof of this. Internal inguinal hernias, and those inguinal hernias which pass through a rent in the aponeurosis, must be incapable of ever acquiring so great a volume, or of descending to so great a distance upon the thigh. It follows from this, therefore, that the differential diagnosis of inguinal hernias from each other, must present less embarrassment than is generally believed. It may be considered in fact as established, that when they are in the condition of bubonocele, the signs mentioned in the beginning of this paragraph will almost always be found sufficient to a careful practitioner, and that when the hernia actually becomes scrotal, it is next to impossible that there can exist anything else than an external inguinal hernia.

G. At first sight, it would seem that an inguinal could never be *confounded with a crural hernia*: it would be an error however to suppose so. M. A. Cooper relates the case of a crural hernia in a woman, which was in this manner mistaken for an inguinal. A fact of the same kind had been mentioned by Pelletan, who got down upon the viscera before he found out his mistake. A similar case is cited by M. Marjolin, and another related from the practice of M. Roux. It is in women especially that mistakes of this kind are likely to be made. Various circumstances moreover may explain them; in one case there were ancient cicatrices in the fold of the groin, which had forced the crural hernia into a situation in front of the inguinal ring. In other cases, this derangement is caused by a relaxation of Poupart's ligament, the presence of an adipose border, or the coexistence of lymphatic or other tumors, which prevent our

distinguishing with precision the point at which the hernia sat out. In man this mistake may be avoided, by following the course of the spermatic cord, inasmuch as the finger, if this canal is free, will scarcely ever fail to recognize the ring, whereas, if it has actually served as the passage for the descent of the hernia, it will be found filled up with it. In women we have not this guide; from the ring being naturally small, and from there being no prolongation of it whatever to the outside, it becomes a difficult matter in a great number of cases to trace its position with accuracy; M. Nivet has justly remarked, that by first seeking for the spine of the pubis through the integuments, in order to proceed gradually from that point to the antero-superior spinous process of the ilium, following along the track of Poupart's ligament, we need not have any apprehension of making a mistake, it being understood that those hernias are crural which are situated below this line, and those inguinal which are placed above it; but Poupart's ligament is sometimes so relaxed and so difficult to be distinguished from the other aponeurotic tissues, in women possessing a certain degree of embonpoint, that this sign, though valuable to be remembered, might also frequently lead to mistakes. It may be moreover readily conceived that, where the hernia has taken place through a rent in the outer border of the ring, or in Gimbernat's ligament, or in the upper border of Poupart's ligament, the surgeon might be placed in an extreme degree of embarrassment; it must be admitted therefore, that in certain exceptional cases, inguinal and crural hernias may be quite easily confounded.

H. If the hernia were constituted of the iliac colon, either on the left side, as I have frequently seen, or upon the right, an instance of which is related both by Lassus and Pelletan, if it be not the same case, we may suspect it from symptoms, which usually exist in a hernia of the large intestine, and especially from the almost utter impossibility of making the injections penetrate beyond a few inches into the rectum. The presence of the *cæcum* in an inguinal hernia, would be indicated by the slow and gradual development of the tumor, the impossibility of effecting its complete reduction, notwithstanding the large dimensions of the rings, the slight disturbance which it causes in the digestive functions, the stercoral prominences which may be sometimes distinguished through the envelopes of the tumor, and by its fixed position in the neighborhood of the ring, even though it may have already acquired a very considerable volume. The *small intestine*, on the contrary, gives rise to hernias, which in most cases come on very suddenly, which afterwards acquire, as it were by starts, (*comme par saccade*), their ultimate size, which may be completely reduced while being accompanied with a sort of gurgling sound, and which very frequently give rise suddenly to colics, constipation, and vomitings. A *hernia of the stomach* would be recognized by its alternate distension and disappearance, before and after a repast, by its almost instantaneous development at the moment after a person has been drinking, by its dull bruit (*matité*) under percussion after eating, and by the clear sound which is emitted when the patient has been fasting; it is in this manner, at least, that M. Fabre, distinguished it in the case which he noticed, and which M. Lebert, (*Journ. des Conn. Méd. Chir.*, 1838, p. 145,) has since

completed. But since anatomical investigation has already afforded some light in this respect, inasmuch as M. Yvan, who found the stomach in an inguinal hernia in the dead body, does not mention that it was so recognized during life, it would be advisable in my opinion not to attach too much importance to such signs. The *bladder* might be supposed to be implicated in a hernial tumor, if this last should usually disappear after the expulsion of the urine; or should become distended on the contrary when a long space of time had intervened since it had been discharged; or if the pressure made upon the tumor occasioned pain in the direction of the urethra, and a desire to urinate, or if, when pressure was made upon it, it appeared to become flattened and take a direction towards the pelvic cavity, instead of actually re-entering into the abdomen. As to hernias of the ovari-  
um, they might be confounded with certain lymphatic ganglions, or with some other abnormal tumors; but besides their globular form and slightly bosselated character, their mobility, the small size of their pedicle, and their reducibility, they occasion in women, when pres-  
sure is made upon them, a pain and sensation which are so charac-  
teristic, that it would be difficult to make a mistake in this matter. *Hernias of the uterus*, apart from the state of pregnancy, have been too rarely noticed to enable us to enumerate their signs. The same remark applies to hernias of the fallopian tube, spleen, liver, and kidney.

### § III.—Complications of Inguinal Hernia.

From what precedes, it is perceived that inguinal hernia, when in its simple state, may almost always be distinguished from other diseases; but this is far from being the case when it is accompanied or complicated with certain conditions. The complications of inguinal hernia, moreover, are numerous and varied.

A. *Ancient hernias*.—When the inguinal hernia dates to a remote period, and never has been reduced, it sometimes acquires a volume which is absolutely monstrous. It has been seen to descend to the middle of the thigh, and nearly as far as to the knee. In such cases it must be impossible to say, whether it is on the inside or upon the outside of the spermatic cord, or whether it contains this or that portion of intestine; it is under these circumstances that we encounter here at the same time, several of the viscera, the large and small intestine, bladder, kidney, spleen, liver, and stomach. The old man mentioned by M. Fabre, had a hernia of 90 centimetres in circum-  
ference, with elephantine degeneration of the scrotum.

B. *Adhesion of the parts*.—The adhesions in inguinal hernia are made at the expense of various organs. In congenital hernia, for example, the testicle may become attached to some point upon the epiloan or intestine. Various kinds of accidents are thereby produced. If the external ring is large, the hernia will not return into the belly without dragging the testicle with it into the inguinal canal or even into the abdomen. In the contrary case, the retraction of the dis-  
placed organs draws up the testicle against the borders of the ring, and may thus cause it to be painfully compressed. The instances of this complication are not uncommon, and Zimmermann himself

was one of the most remarkable. An error may take place in these hernias, because in epiploic hernias, properly so called, it may happen that the epiploon may present itself below as a globular mass, adherent to the bottom of the sac. In this case, if there was only one testicle, or if in consequence of a displacement of this organ, it should not be found at first, the surgeon might mistake the epiploic tumor for it, and thus erroneously suppose that there existed a congenital hernia of the preceding species. The intestine in issuing from the belly, may become lodged in the inguinal canal by penetrating above or below a bridle, in such manner as to pass afterwards in an opposite direction by inclining from right to left, or left to right, so as to become speedily liable to strangulation in this position. It may, moreover, easily be understood, that in such cases two intestinal hernias may be formed in the same sac, viz., one in each compartment made by the epiploic diaphragm. In a patient who died at La Charité in 1836, I met with an arrangement of the epiploon which had not hitherto been noticed. This organ existed in the sac in the shape of a cylinder of the size of a child's fore-arm, four inches in length, and which was adherent by means of some bridles to the bottom of the sac, and hollowed out throughout its whole length into a canal of near an inch in diameter. It was in this cylinder that the intestine had become lodged and strangulated!

C. *Secondary degenerations.*—These *epiploic masses* sometimes become, in their turn, the seat of degenerescences. There are sometimes formed here, for example, cysts which are either multiple or of the character of hydatids; in other cases in small number, so as to resemble large sacs, as in hydrocele. In such cases the idea of a hydrocele, either of the cord or of the tunica vaginalis, may equally well present itself to the mind as that of a hernia, (see Hydrocele.) Sometimes also they inflame and become painful, and even the seat of actual abscesses. Should this morbid process be established in the inguinal canal itself, symptoms of strangulation may be manifested; only that we could almost always, in such cases, avoid making any mistake by noticing that the pain is then heavy, deep-seated and pungent, as in phlegmon, and generally confined to the seat of tumor, that the constipation is rarely obstinate, that there is rather constant nausea than actual vomiting, and that the substances vomited at least do not resemble stercooral matters. Many surgeons have cited examples of these kinds of strangulation in the inguinal canal, which have been mistaken and operated upon for actual hernia. It may also happen that without any epiploic hernia, the cellular tissue in the spermatic cord will become swollen in the inguinal canal to such extent as to constitute in that part a painful and hard border, and to give rise to some of the symptoms of hernial strangulation, whether a hernia has actually taken place or may never have existed there.

D. In certain cases also the *adipose matter* which lines the sac presents an arrangement which has never been pointed out by any body, and which I met with in one instance in March, 1837, at La Charité. After the intestinal hernia was reduced, there could be felt through the external coverings several borders, (*bourrelets*,) which led to the belief of the existence of some portions of the intestine or epiploon left in the sac. An incision having been made, we

perceived that these bourselets, which were an inch in diameter and slightly flattened, were so nearly similar in appearance to the small intestine, that we stopped for some time to examine them, before knowing what course to take. Being free and floating in the interior of the sac, they appeared to adhere to this last only by means of a species of mesentery. They were composed in reality of adipose matter, enveloped in a duplicature of the peritoneum, and projecting in the hernial sac in a similar manner to those synovial pelotons which are seen in the interior of the articulations, and were, moreover, continuous with the adipose matter of the fascia propria.

E. Inguinal hernia is frequently complicated with *hydrocele*, and this hydrocele presents itself under three principal varieties; sometimes it is nothing more than the ordinary hydrocele of the tunica vaginalis, which has been produced by the irritation caused by the proximity of the displaced viscera, or by the pressure made upon the track of the spermatic cord by the bandages or by the tumor itself. Without admitting that this complication is as common as M. Tessier thinks, I feel compelled to confess that it is frequently met with. In such cases it may itself become the source of another complication. Dupuytren, M. Bérard the elder, and some others, have related facts to me which prove that the hernia enveloped in its sac has occasionally penetrated into the cavity of the hydrocele through a laceration in the tunica vaginalis, and become strangulated in that position. In other cases the *hydrocele* takes place in the *sac itself* at the same time, and in connection with the hernia which exists there. This is a complication which is frequently met with, and one which I have pointed out above. In entero-epiploic hernias, after certain symptoms of strangulation, we may succeed in returning the intestine into the belly; but the epiploon becomes congested and swollen to such degree that it soon fills up the inguinal canal. There takes place at the same time an exhalation of serosity in the sac below the ring. I saw at La Charité, in the year 1837 only, three instances of this kind, two in men and the third in a woman. In one of these patients the hydrocele took place under our observation from one day to the next, though it contained eight ounces of serosity. This was a man in whom the hernia, which was also ancient and generally kept up with difficulty, had become strangulated a great number of times, but was also always reduced by the simple taxis. When he came into the hospital, it was after the usual taxis had failed, and the accidents had existed for the space of forty-eight hours. In the morning, at the time of my visit, I succeeded in returning the intestine into the belly; but the epiploon, which appeared to be adherent, remained in the sac, and especially in the inguinal canal. Twenty-four hours after, when I saw the patient again, the symptoms of strangulation had ceased, but the tumor had acquired the size it had the evening before, and we were greatly surprised to find it had now become changed into a true hydrocele. I extracted from it eight ounces of serum. In the two other cases, the symptoms progressed precisely in the same manner, except that the reduction of the intestine had been effected before their admission into the hospital, and when I visited them the hydrocele had been established. In February, 1839, I found in the sac of a hernia of this description, the

epiploic mass in the midst of a thin stratum of serosity. In such cases we have the signs of an epiploic hernia or strangulation of the cord in the inguinal canal, together with those of encysted hydrocele of the cord or tunica vaginalis.

#### § IV.—*Irreducible Hernias.*

Inguinal hernias are naturally divided into two great classes: those which may be reduced without any very great degree of difficulty, and those which are irreducible. Irreducible hernias without a strangulation have this peculiar feature, whether in the scrotum or elsewhere, that it is not the narrowness of the passages but the alteration of the displaced organs which prevents their reduction. Thus hernia of the cæcum is generally irreducible, because the intestine adheres to the bottom of the scrotum. It is the same in most cases, and from the same cause, with those of the bladder and colon. As to epiploic hernias, they are irreducible from other causes. In fact the masses, cylinders and cysts which are sometimes contained in them, frequently acquire so large a volume that they cannot be made to pass through the inguinal ring.

#### § V.—*Rupture of the Sac.*

It is in inguinal hernia especially that we meet with actual ruptures of the sac from external violence. It may readily be conceived in fact, that a fall upon the scrotum may sometimes rupture the sac, and at other times some of the organs which are contained in it. The kick of a horse, as in the postilion mentioned by J. L. Petit, in the same way as a blow of any other kind, may produce the same result. Such cases of rupture of inguinal hernia are not very uncommon. Boyer cites an example of one, and another is found in the works of M. A. Cooper. MM. Divon and Plaignant, and M. D'Arbefeuille and M. Breidenbach have published several others, without enumerating those which are found scattered in different scientific collections, and which relate either to the rupture of the vessels, that of the intestine or epiploon, or to the rupture of the external envelopes of the hernia itself.

#### § VI.—*Hernial Bandages.*

*The palliative treatment* of reducible inguinal hernia consists exclusively in the employment of *bandages*, vulgarly known under the name of *trusses*.

A. Whatever some practitioners may say to the contrary, inguinal hernia in *children* ought to be kept reduced by trusses as early as possible. By means of this precaution in fact, we may hope that by the growth of the little patient and the changes which are wrought both in the thickness of the abdominal walls and in all the organs, to effect a radical cure in the space of six months, a year, or at farthest in two years. Perhaps at this age, in place of the ordinary bandage, which it is sometimes difficult to keep properly applied, it would be well to recur to the method pointed out first by M. Lawrence and

afterwards by M. Meynier, and which consists in attaching over the ring graduated plates by means of long adhesive plasters, which surround the pelvis and upper part of the thigh.

B. *The pelote of trusses* is generally applied in a manner which is but poorly adapted to the requirements of the anatomical arrangement of the parts. Taking its point d'appui upon the border of the pubis in front of the ring, it leaves the interior of the inguinal canal entirely free, and consequently presents but a very imperfect obstacle to the production of incomplete inguinal hernia and strangulation at the posterior ring. Again, the spermatic cord, which is almost always drawn in such cases to the external border of the ring outside of the pubic spine, is almost unavoidably compressed in such manner as to render it incapable any longer of performing its functions without much difficulty. Everything shows, therefore, that a reform is desirable in this respect in the application of bandages. In recalling what we have said of the contexture of the parietal walls which are traversed or may be traversed by inguinal hernias, it will be readily perceived that a compression which should be made to act on the entire length of the canal in such manner as to maintain its two sides in contact, would at the same time be less painful for the patient, continued with greater facility, and possessed of greater efficacy than by the ordinary method. In this manner, the organs being prevented from becoming lodged in the posterior ring, which is then as closely shut up as the anterior, would allow of the two walls of the sac becoming agglutinated, and consequently render the reproduction of the hernia impossible in a great number of cases. This is a suggestion which was urged a long time since by M. A. Cooper, and which A. Thomson and M. Malgaigne have more recently endeavored to enforce. Some bandagists had already anticipated it; and the pelotes of M. Fournier de Lempdes, among others, appear to have been constructed on this principle. It is also certain that many radical cures have been attained by means of these bandages.

C. The pelote of the truss ought to make its strongest pressure above Poupart's ligament, at the union of the two outer thirds with the inner third of the space which separates the spine of the pubis from the antero-superior spinous process of the os ilium, or as M. Cooper recommends, on the middle of the line which extends from the iliac spine to the symphysis pubis. To render the direction still more anatomical, I should add that the pelote ought to rest on the triangle which is bounded, on the inside by the expansion of the external border of the rectus muscle, below by Poupart's ligament, and above by the lower border of the transversalis abdominis muscle. I have no necessity of remarking that these observations apply almost exclusively to external inguinal hernias, and that for internal inguinal hernias, or such as take place through a rent in the aponeuroses, the bandages which are applied directly over the opening ought still to be preserved.

D. In inguinal hernia of the tunica vaginalis, it may happen that the testicle remains in the canal above the displaced viscera, or that these latter, while being reduced, may draw it with them; the application of the bandage may in such cases be attended with difficulty. If by means of judicious precautions it should seem to be practicable

to adjust the pelote upon the ring or inguinal canal, between the testicle and the organs which have been reduced, then we should not hesitate to adopt it. The bandage ought still to be applied upon the ring where the testicle has been wholly returned, together with the viscera. If on the contrary the testicle ascended only as high as the ring or could not in any way be reduced beyond the inguinal canal, the pressure made upon it by the bandage would be attended with too much danger to allow of its application.

E. In entero-epiploic hernias, where the intestine and epiploon admit of being perfectly reduced, there is no particular direction to be given in relation to the application of the bandage; but should any adhesions have formed between these two descriptions of organs, and the epiploon were reducible only in part, we should have to proceed in the same manner as in congenital hernia. The following is a case which was attended with considerable embarrassment: a filament of epiploon adhered to the testicle, and one could not ascend or descend without the other; the hernia could not be reduced without causing pain in the testicle, and the testicle could not be placed in its proper situation without bringing down the hernia. The case of Zimmermann himself was one of this description. In women, the bandage in inguinal hernia is applied with more facility than in man. The absence of the spermatic cord and the anatomical arrangement which I have described above, sufficiently explain this difference.

F. *Irreducible inguinal hernias* cannot be treated in the same manner as the others, by means of a truss. If they are large sized and ancient, the best plan is to enclose them in a suspensory or species of sac properly constructed, and which will support and make moderate compression upon them from below upwards. When any of the organs of which they are constituted is reducible, it should be pushed back into the belly. If the portion which remains consists of epiploon, or does not threaten to become strangulated, we may make use of a bandage with a concave pelote, which supports and gradually pushes back the tumor more and more against the ring. By means of suspensors or bandages arranged in this manner, we sometimes succeed in gradually diminishing the size of hernias which would appear to be irreducible, and even in effecting their complete return into the belly. This is what takes place, especially in hernias of the cæcum, the sigmoid flexure of the colon, the bladder, and those which are composed of adipose masses or of epiploon.

### § VIII.—*Strangulation of Inguinal Hernias.*

Inguinal hernias are liable, like all others, to the complication known under the name of strangulation.

A. *Strangulation spasmodic*.—An attentive examination of the fibro-muscular layers of the belly, shows that the contraction of certain muscles may sensibly diminish the diameter of the rings in the groin as well as that of almost all the other hernial openings. It may, for example, be conceived that the divergent fibres (*les fibres en sautoir*), which bridle the upper angle of the external ring, and also surround the lower border of Poupart's ligament, would have a tendency to become straightened under the influence of the external ob-

lique muscle of the opposite side, and would thus partially close up the space which separates the two borders of the ring. The fibrous bands which surround the ring, properly so called, approximating together in the manner of the two borders of a button-hole in order to pass in front of the symphysis pubis, are also susceptible of being straightened out, and thus diminishing to a certain extent the hernial opening, should the corresponding external oblique muscle become contracted. The fibres which form the posterior ring, arising almost exclusively from the rectus abdominis muscle, to become attached to the spine and crest of the ilium, may also be drawn up, and thus tend to carry backwards the organs lodged in the inguinal canal, against the lower border of the transversalis abdominis muscle, which latter also, when contracting, might compress them from above downwards. It is therefore evident, that these muscular contractions may narrow the openings of the inguinal canal, and that we should be wrong to look upon the spasmodic strangulation of hernias, as a thing absolutely impossible. I have demonstrated with the scalpel these various anatomical arrangements, first with A. Thompson, and afterwards by myself, in all subjects which I have had leisure to dissect. I have elsewhere published the details of these examinations, (*Anat. Chir.*, 1837, t. I., Introd.) M. Astley Cooper, who sides with the common opinion, nevertheless admits the possibility of spasmodic strangulation by the lower border of the transversalis muscle, at the posterior opening of the inguinal canal.

B. However this may be, strangulation in inguinal hernia may take place at quite a different number of points. In some cases it is at the neck, or the *root of the sac*, and sometimes in the scrotum below the external ring. The first description comprises strangulation at the posterior ring, and also that at the anterior or pubic ring of the inguinal canal. To the second variety belong strangulation through a rupture of the sac, either in the direction towards the integuments, as in the cases above related, or in the septum of a vaginal hydrocele, as in the patient of M. H. Bérard, or through the expanded spermatic cord, as has been seen by M. Goyrand. Strangulation, also, is quite frequently produced by some appendage of the displaced viscera themselves. An epiploic band, which should pass in front of the intestine, as if for the purpose of dividing it into two portions, before becoming attached to the bottom of the rupture; or an opening made in a layer of epiploon within the sac, and through which a portion of the intestine has passed, are calculated to produce this result. The epiploon, rolled up into a cord, may become attached, first on one side and then on the other, making a sort of bridge, or it may afterwards make another bridge by attaching itself again on the first wall of the hernial cavity, and react in this manner upon the intestine in an injurious manner. Two of these prolongations, after having contracted adhesions on each side of the sac, sometimes approximate together in order to become united a little lower down, leaving, in this manner, between them a separation through which the intestine may protrude. I have cited a case where the epiploon, fixed at the bottom of the sac by means of a bridle, represented, as high up as the ring, a hard and hollow cylinder, in which a noose of the ileum had become strangulated. Hey

has figured a scrotum in which we see a portion of epiploon attached by its two extremities to the sides of the sac, and presenting in its middle portion a complete circle, through which the intestine protruded. In a case which I had an opportunity of examining after death, the strangulation was caused by a mass of epiploon of the size of a large pullet's egg. In a patient operated upon by Pelletan the same result was produced by a tumor of the mesentery. The appendix of the cæcum would have the same effect if it should be included in the hernia, and its point had contracted some abnormal adhesions. A man forty years of age, whom I operated upon in 1833 at the hospital of La Pitié, had the inguinal canal dilated to an extreme degree; but the cæcum, which especially formed the hernia, had become turned round to the outside and front, in such manner as to strangulate upon the body of the pubis a noose of the ileum which had slipped into the bottom of the scrotum. We may comprehend, moreover, in how many different ways and by what various kinds of morbid alterations a strangulation of the intestine may be produced in the interior of the sac. In respect to strangulations caused by the sac itself, they are constituted of different varieties. Below the ring they sometimes depend either upon a rent in the septum, which separates the hernia from the tunica vaginalis, or upon a laceration of the sac; but in such cases this result most frequently takes place in the contracted portion of an ancient sac. It is necessary to recollect, in fact, that multiple sacs are scarcely ever met with except in inguinal hernias, and that if one of these should have remained empty below the new sac, and was still open at its upper extremity, it might possibly happen that the intestine would protrude into it in consequence of some violent effort. In the vicinity of the inguinal canal, the sac or its neck sometimes acquires so great a degree of thickness and so much density, that this of itself may cause a strangulation. In ancient hernias the agglutination of their folds augments this thickness to a still greater degree; various lamellæ of the fascia propria become attached and adherent to its external surface; while the plastic lymph which unites all these parts together, may, in this manner, bring about a very considerable thickening of the sac. Arnaud states that he met with one which was half an inch in thickness, and M. Graefe has since related a similar case. Strangulation under such circumstances may be so entirely independent of the fibrous openings, that we may succeed in returning the tumor into the belly without difficulty, but without removing the constriction.

Arnaud and Le Dran were the first to urge attention to this arrangement of parts, which have since become generally recognized by the exertions of Pott, Scarpa and Hey. Dupuytren is one of those who has done most to spread the knowledge of these anatomical arrangements among French surgeons. In such cases the strangulation may be altogether annular or exceedingly circumscribed, or it may occupy only the entrance or the exit or middle portion of the neck, as it may also the whole track of this prolongation, and transform it into a sort of ring or encasement. *Strangulation at the neck of the sac*, however, which, according to the school of Dupuytren, occurs in eight or nine cases out of ten, or even still more frequently,

according to the observations of M. A. Bérard and M. King, (*Gaz. Méd.*, 1829, p. 76,) and which MM. A. Cooper and Lawrence are far from admitting in this large proportion, is in reality quite a rare occurrence. If I venture to place myself in opposition to such high authorities on this subject, it is because I consider that I have discovered the error by which they have been misled. The strangulation in inguinal hernias takes place, as a general rule, at the external or internal ring of the canal. The neck of the sac, properly so called, is rarely the seat of strangulation, except in certain ancient hernias. When it takes place at the posterior ring, if we push back the hernia we frequently succeed in making it pass through the external ring, and in transforming it from a complete into an incomplete hernia. During the operation the finger introduced into the canal, soon perceives a movable ring, which may be easily pushed back in a direction towards the belly. In such cases it has been supposed that this circle had been formed by the neck of the sac, while in reality it is made by the posterior fibrous ring of the inguinal canal. Nor do I hesitate to affirm that in a great number of cases attributed to the neck of the sac itself, the strangulation takes place at the orifice in question.

C. *The signs of strangulation* in inguinal hernia are in general the same as in any other hernia, but they differ somewhat according to its nature and precise situation. At the *external opening* of the canal the strangulation is characterized by a species of tense neck tightened on a line with the ring; by the hardness of the tumor and its fixed position immediately below; by its softness and the ability to depress the viscera which are placed above or at the iliac fossa; by the pain which is caused by the pressure at this point, and also by the impossibility of detecting the slightest void between the spermatic cord or root of the hernia and borders of the inguinal ring. Strangulation at the *posterior ring* is distinguished by other characters. Here the organs are exempt from any kind of pressure at the external ring. On the contrary we remark that the species of cylinder contained in the canal is tense, elastic and painful. If the hernia is complete we find that under the *taxis* it appears to return through the external ring, but that it comes back immediately and without abandoning the ring which strangles it, as soon as the cylinder of the inguinal canal is allowed to go back towards the iliac fossa. This reduction is not accompanied by any gurgling sound, and the viscera only leave the scrotum to augment the tumor contained in the inguinal canal. When the strangulation is caused by the neck of the sac, we usually find the external ring free, as in the preceding case; but the inguinal canal itself is no more distended than in strangulation by the anterior opening of the canal. If the tumor appears to return, it is for the purpose of becoming lodged in the fascia propria under the peritoneum of the iliac region.

Strangulation in the *interior of the scrotum* would be distinguished in this way, that while the rings, as well as the canal appear to be free, the hernial tumor, nevertheless, continues irreducible, and also by the fact, that the most painful point in such cases, is not either at the posterior or at the anterior opening of the inguinal canal, but in reality in some part of the scrotum, properly so called.

As to the mode of ascertaining, under such circumstances, whether the strangulation is produced by a laceration of the sac, a rent in the tunica vaginalis, or by some bridles or perforation of the epiploon, or by a contortion of the intestine, or by the neck of some ancient sac, this appears to be a point utterly impossible. The distinction of the different kinds of strangulation in inguinal hernia is reduced, therefore, nearly to the following points: 1st, we may decide whether the obstruction exists below Poupart's ligament, or at some one point in the parietes of the abdomen; 2d, in this last mentioned region it is frequently in our power to avoid confounding a strangulation at the external, with one which may be produced at the internal ring, and these two last with a strangulation caused by the neck of the sac. It is well to remark, however, that symptoms of strangulation in inguinal as well as in any other hernia, must present modifications according as the hernia is found to be composed of this or that organ. Thus, in hernia of the cæcum, as the course of the matters are not obstructed, except at a very advanced period of their elaboration, nor scarcely ever entirely intercepted, it rarely happens that the vomiting and constipation at first are as marked as in hernias that are purely intestinal. If the hernia in question is one of the appendix only of the cæcum, as in a case related by M. Bougon, (*Bull. de la Fac. de Méd.*, t. V., p. 248,) and in that of M. Taramelli, it is difficult to understand how there could be produced by it symptoms of an actual strangulation. M. Taramelli, however, affirms, that in the patient he operated upon successfully, all these symptoms existed. Mery also speaks of a hernia in which an appendix analogous to that of the cæcum appeared to have been strangulated; but as there was a strangulation also of another portion of intestine, it would be wrong to conclude from this case that the accidents were exclusively referable to the appendix. M. H. Larrey (*Revue Méd.*, 1830, t. IV.,) has seen one of these diverticuli near the ring, and another similar case was shown to me in 1838. The sigmoid flexure of the colon is to be considered with the same restrictions as the cæcum; nor do the bladder, ovary, womb, spleen, kidney and liver appear to be of a nature to give rise to either constipation or vomitings of stercoral matter. I would make the same remark of the epiploon and the testicle, of strangulation of the cord, and of adipose tumors and inflammation of the sac; so that in inguinal hernia, as in any other, an insurmountable constipation with stercoral vomitings, positively indicate a strangulation or obstruction of a portion of small intestine, or of a noose of the colon. Mistakes, moreover, in a case of inguinal hernia, are almost always owing to other diseases, which have effected an alteration upon the seat of the lesion. If, for example, a man affected with hernia in the groin should be attacked with symptoms analogous to a cholera, as was seen in the case of M. A. Vidal, or in that of M. Briquet, the surgeon would naturally be induced to believe that it was a case of strangulation. An inflammation in the interior of the sac, or the transformation of the sac into an actual abscess, causing a revulsion, as has been seen by Dupuytren, M. Duparcque and M. Key, sometimes either on the viscera, which have not been reduced, or upon the peritoneum, intestines and stomach, to such degree as to bring on vomitings and constipation,

would in the same way lead to deception. So also strangulation and inflammation of the epiploon, testicle, or cord in the interior of the canal or sac, might equally give rise to error; but a mistake would almost always be avoided by recalling to mind what I have said above. Strangulation in inguinal hernia being clearly ascertained, there exists an obvious necessity of removing it as speedily as possible. All the rules and remedies pointed out in speaking of hernias in general, are especially applicable to inguinal hernia in particular; so that there is no necessity in my dwelling in this place on the subject of bleeding, nor of leeches, baths, purgatives, tobacco injections, acupuncture and galvanism, nor of the various topical applications which have been successively extolled under such circumstances.

### § VII.—*Operation.*

The operation for inguinal hernia is performed at every period of life.

A. *In Children.*—It would be erroneous to suppose that it is never required in young children. Pott and other authors had already remarked that enterocele might become strangulated and cause death in the first months of infancy. M. Denonvilliers has communicated to me another proof of this: A child, eight months old, died with symptoms of peritonitis, when upon opening the body it was discovered that death had been caused by a strangulated inguinal hernia. M. Heyfelder operated for hernia in an infant that was only eight days old, and Dupuytren upon another that was twenty days old. The one cured by M. Hunt was twenty-nine days old, and of the two cited by M. Goyrand, one was four months old and the other six. M. Lawrence operated upon one fourteen months old, and the hernia was not congenital. The case of M. Long was that of a child of the same age, while M. Hildebrand's was eighteen months. Out of these eight operations, five at least were successful. It is readily to be conceived also, that strangulation at this period of life is easily confounded with most of the diseases of the lower belly. In a male child, fifteen months old, whom I operated on at La Charité, in 1837, the hernia was complicated with hydrocele. The want of exact information, the cries of the infant, the condition of the scrotum, in fact, every thing conspires, in such cases, to render the diagnosis obscure and difficult. As to the operation, properly so called, it is evident that, from the indocility and want of reason in the little patient, it must necessarily be extremely difficult, and require a degree of caution, both in respect to the manual or the subsequent symptoms, which it is far from so imperatively demanding in adults.

B. *In Man.*—As the integuments in general preserve a certain degree of pliancy at this point, it is almost always practicable to take up a fold of them for their incision without being under the necessity of stretching them, as is done in making a simple incision.

I. *Incision.*—Whether we adopt, moreover, this or that method, it is advisable that the incision should extend to a half an inch or an inch above the ring, and that it should descend, unless there should be some special reason to the contrary, as far down as to the bottom of the tumor, following its greater axis. This incision requires some

precautions. From the spermatic cord not having a fixed position, we might be liable, in certain cases, to wound the vas deferens or spermatic artery, as happened in two instances to Hey. In external inguinal hernia, it has been seen to pass in front of the tumor in such manner as to be found upon the outside when it reached the lower part of this last. I have seen three examples of this in patients who each had an enormous hernia. In internal inguinal hernia the same thing may happen, but in an inverse sense; that is to say, that the spermatic cord placed externally at its emergence from the canal, may come gradually in front and then on the inside, then unite with the testicle which is below, and also on the inside. There can be no doubt that in cases of this description, the instrument would almost inevitably wound one of the parts which make up the spermatic cord, as must have easily happened in the cases related by Schmucker, Camper, Le Dran, Boudou, M. Fardeau, Scarpa, A. Cooper, Lawrence, Blizzard and some others. The tissues therefore which separate the integuments from the sac are to be incised with caution. The division of these intermediate layers moreover is to be made according to the rules we have laid down in the beginning. When the inguinal hernia is direct, the incision of the integuments is to be parallel to the axis of the body. When on the contrary, the tumor is external and not of large size, it must be oblique from above downwards and from without inwards; but when the hernia is very large it will be found advisable to give the incision a very elongated semilunar form, with its convexity looking upwards and inwards.

II. As to the sac, if it should present no inequality, it would be most prudent to perforate it below, in front, and slightly to the outside. After having laid it open freely above, as high up as the ring, the question then is to be asked whether it is indispensable to prolong this incision completely down to the bottom of the sac. Some persons consider the contrary the correct course. Hey among others, as well as Scarpa, from an apprehension of wounding the tunica vaginalis, which lies in this direction, recommend that we should leave below a half an inch at least of the sac undivided. In reality it is almost a matter of indifference whether we adopt either the one or the other of these methods. When we have to operate upon a congenital hernia, the organs having enlarged and distended the tunica vaginalis below the testicle, present in this respect two formidable difficulties to be avoided. If the sac is opened throughout its whole length, the testicle constantly tends to escape from the bottom of the wound, and may thus give rise to accidents. If we incise the serous pouch only in its upper half, we shall find it much more easy to restrain the testicle, but the pus, if it should form, will become accumulated in the cul de sac preserved below, and thus give rise to other serious symptoms. The best course therefore would be to make a large opening, and be satisfied with afterwards bringing the borders of the tunica vaginalis in front of the testicle, and in maintaining them there by one or more points of suture.

III. *To remove the strangulation.*—Owing to certain vessels which it is important should not be wounded, inguinal hernia presents one of those cases in which it would be most advisable to have recourse

to *dilatation*, if this method were at all practicable. Theory lays it down that the *debridement*, the only resource employed at the present day, should be performed by this or that process, according as the case under consideration is this or that form of bubonocele.

a. For example, for those hernias in which the neck is situated external to the epigastric artery, that is to say, for all those which have passed through the iliac opening of the inguinal canal, the debridement is to be made *to the outside*, on one of the points of the external semi-circumference of the ring. On the contrary, to the *inside* for internal inguinal hernias, and directly upwards when there is an epigastric artery on each side, as in the case communicated to me by Lauth. These different indications explain why such opposite rules have been given on this subject by the most respectable authors. Sharp, La Faye, Pott, and Sabatier recommend that the debridement should be upwards and outwards, because the epigastric artery is usually found upon the inside; Verduc, Garengeot, and Heister, on the contrary, recommend that it should be made to the inside, and Bertrandi, who saw a case in which the debridement was outward, cause a hemorrhage by the division of the epigastric artery, ending in the death of the patient, gives the same advice. Finally, it was from the dread of finding this artery upon the one side or the other, that J. L. Petit, before Rougemont, Autenreith, Cooper, Scarpa, Richerand, and Dupuytren, who followed the same practice, advises that the stricture should be divided *directly upwards*. It is true that Desault and Chopart had already remarked, that the artery is upon the inside when the spermatic cord is found posterior to or upon the inner side of the tumor, and that it is upon the outside in the contrary case. But to arrive at a definite opinion upon this subject, there was wanting the anatomical knowledge which exists at the present day.

b. To lay it down as a rule that we should divide the stricture outwardly when the hernia is external, and inwardly when it is internal, could be a matter of no importance, unless there were less difficulties in distinguishing those two varieties of the disease from each other. Moreover, when there are two *epigastric arteries*, or when the only one which exists arises from the obturator at a certain distance from the external iliac, it might very naturally be found upon the inside in internal inguinal hernia, as it is usually observed to be in external inguinal hernia, in the same way that the external epigastric artery in the case mentioned by Lauth might have been situated outside of an oblique inguinal hernia. It was precisely owing to this uncertainty that MM. Cooper, Scarpa, Richerand, and Dupuytren, prefer the method of Petit or Rougemont. By incising directly upwards they remark, that it is a matter of little importance whether the artery be upon the outside or upon the inside, whether there be two of them or one only, or whether the hernia be internal or external, as we have no hemorrhage to dread, for the instrument always divides the tissues parallel to the usual direction of the vessels. An objection however which exists is this, that the epigastric artery, in place of following a line parallel to the axis of the body, is directed obliquely from without inwards, and from below upwards, in order to reach the umbilical region, while

passing above an internal inguinal hernia; while in an external inguinal hernia, I have seen it depressed so much to the inside, that it formed, so to speak, a semicircle, the upper extremity of which might have been very easily wounded in a perpendicular incision. As it rarely fails to be displaced by the root of the tumor, we cannot in reality ascertain whether it is vertical rather than oblique, in one direction or another.

c. I will remark that in internal inguinal hernia, the *pubic branch furnished by the epigastric*, would almost inevitably be wounded, and that in cases where its great size was abnormal, an alarming hemorrhage might result from this, as appears to have been the fact in two cases noticed by M. Lawrence. No method therefore effectually protects us from hemorrhage. Nevertheless, the epigastric artery is but rarely wounded. From whence does this happen? In the first place, because this artery, from being pushed back by the neck of the sac, is almost always situated at the distance of two or three lines from the constricting circle, and that in most cases we do not give a greater extent to the incision than this. In the second place, we escape the artery because, in the strangulation caused by the ring of the external oblique, the incision is made upon a circle too remote from the artery in question to incur any apprehension of our wounding it; from whence it follows that after rigidly examining this matter, it is found that the debridement may be made in any direction without danger, provided we do not give it too great an extent, and that the successful results obtained at Vienna at the beginning of this century by Rudthoffer, who always divided the stricture upon the inside, after the manner of Bertrandi, present nothing remarkable in this particular. If we add to this that internal inguinal hernia is a rare occurrence, and that in our days the debridement outwards is preferred in the great majority of cases, we may readily comprehend why hemorrhage, as a consequence of kelotomy, is so uncommon an occurrence. Nevertheless, as it has been noticed in several instances, attention is still required on the subject of the means to be employed to avoid it.

d. *The author.*—In every strangulation at the inferior opening of the canal, the debrideinent, whether made by means of a convex bistoury, guided upon the pulp of the finger, as Bell recommends, or what would be better still, by making use of the point of a straight bistoury, also protected by the finger, or of a blunt-pointed bistoury, which incises from the free border of the ring towards a point more or less remote from its circumference, would secure us from every danger, inasmuch, as by following these directions, the instrument does not penetrate as far as the posterior surface of the *fascia transversalis*. To glide the bistoury of Pott, or the common blunt-pointed, or in fact any straight bistoury whatever, into the ring, in order to divide its internal border near its lower attachment, and transversely from without inwards, is a still more easy and certain method. I have found that we could in this manner divide the stricture without danger, as largely as was desirable. In the other cases, the repeated divisions, whether by means of the blunt-pointed, straight, or with the curved bistoury, inasmuch as one or two lines of depth only are sufficient to each incision, are, if I am not de-

ceived, calculated, in whatever direction they may be made, to render the lesion of the epigastric artery a thing almost impossible.

IV. If in spite of all these precautions, the *artery* should have been *wounded*, two instances of which were related to Gunz at Paris, the evidence of which was established on opening a dead body by Bertrandi, and by the cases related by Richter, Le Blanc, Hey, A. Cooper, Scarpa, Lawrence, M. MacKay, &c.—what is to done? M. Lawrence states that he found the epigastric branch completely divided in an individual operated upon for strangulated inguinal hernia, but in whom death took place from another cause. In a second case the hemorrhage was suspended in consequence of syncope, and the patient was perfectly restored. But the question to be ascertained is, whether the blood in this case really did make its escape from the epigastric artery. I myself have seen in the dead body of a patient, who died in consequence of a penetrating wound of the abdomen, an entire division of this vessel, the hemorrhage from which had been quite inconsiderable, and had ceased spontaneously. It might be possible, therefore, that a wound of this description might repeatedly occur, without the surgeon being conscious of it. A ligature applied, as recommended by Bogros, upon the root of the artery itself, or through the interior of the wound, by means of the various instruments proposed by Arnaud, Schildner, Richter, Desault, and many other practitioners, would be attended with too much difficulty in its execution, and offers too slight a prospect of success to justify our attempting it. It is better to pass beyond the ring a sort of chemise or small sac of fine linen, the bottom of which has been filled by soft lint, in order to constitute it into a tampon, by means of which we afterwards make compression upon the parts from behind forward, or from the peritoneum towards the integuments. This is the process which Hey and Boyer adopted in the successful cases related by them, or which are given upon their authority.

V. *Reduction*.—The best mode of effecting the reduction of the liquids or matters enclosed in the intestine, is to embrace the whole mass of this latter with the palm of the hands, and to make gentle pressure upon it, until it is almost entirely emptied. It is at the groin particularly that we should be on our guard not to force the viscera in between the peritoneum and the *fascia transversalis*, or into the substance of the parieties of the abdomen, for it is in this description of hernia that Le Dran, Callisen, La Faye, Sabatier, Pelleitan, Lassus, Hasselbach, M. Delmas, M. Lawrence, and myself have noticed the accident I have mentioned. Nor do we anywhere also so often find bridles behind the ring, caused by an adhesion of the appendix of the cæcum, a prolongation of the epiploon, or an accidental band, &c. It was at that part also, that Hey found the sac divided horizontally by the epiploon into two distinct pouches, one anterior, containing only serum, the other posterior and enclosing the intestine. There is scarcely perhaps any anomaly whatever, or any of the degenerescences of the digestive organs, or the epiploon, which has not been found in inguinal hernia. This is the variety, moreover, which has presented those appendicula, in the form of fingers of a glove, which have been noticed by Ruysch, F. de Hilden, Méry, Littré, and M. H. Larrey, as well as by myself,

and which were connected with a point more or less higher up upon the ileac portion of the intestine. When the inguinal hernia is ancient, and of excessive volume, as it is rare that the displaced viscera, under such circumstances, have not contracted adhesions with each other, which are difficult to be destroyed, or that they have not in some respects become agglomerated together, in such manner as to represent in certain cases a mass purely fleshy, an attempt at reduction in such cases is not always advisable. If in such cases the hernial envelopes have been divided throughout their whole extent, we confine ourselves to returning the free portions into the belly, while the rest is left externally; the whole is then covered with compresses, saturated with emollient liquids, which, with the horizontal position to be preserved by the patient, will gradually bring back the organs as far as to the ring, if not even into the interior of the belly itself.

VI. It is in this modification particularly that Ravaton, Monro, Boyer, Scarpa, and MM. Cooper, Crawther and Lawrence recommend, as J. L. Petit did, that we should divide the stricture without *opening the sac*, after the method which M. Raphael supposes he had invented, but which he had only combined with a suggestion of Bell upon debridement in general. In such cases therefore we make an incision of some inches in length at the root of the tumor, in order to arrive gradually upon the neck of the sac without opening into it. A canulated sound is immediately introduced between this neck and the ring, which latter is then divided in conformity to the rules laid down above. As soon as the strangulation is destroyed, the reduction is to be undertaken immediately, if the viscera can be pushed back into the belly without its being attended with too much difficulty. In the contrary case we confine ourselves to returning those which readily yield to our efforts, while the remainder are supported or kept up by a suspensory or a bandage, which is to be arranged in a proper manner. If, after having divided the ring, the strangulation should continue, we should perforate the neck of the sac and then introduce into this opening a blunt-pointed bistoury, and divide it with the usual precautions. In ordinary cases after the organs are reduced, the sac is sometimes so movable and so little adherent that we are enabled to detach it as it were, and to gather it in mass, as Garengeot says, to impact it in the ring or to excise it. Without recurring again to what I have said on this method in the preceding pages, I cannot omit remarking that if we decide upon adopting it in inguinal hernia, we ought at least to assure ourselves previously of the situation occupied both by the vas deferens and the spermatic vessels.

VII. *Another method* still has been proposed for inguinal hernia, viz: that of M. Collie. The incision is made from the exterior to the interior, from the beginning to the end of the operation, in such manner as to divide the sac completely in the same way as the skin. The incision in the first place is directed upon the whole length of the inguinal canal, in order to open into the sac on a line with the external ring; but this kind of incision, which presents no advantage and which immediately strikes one by its dangerous character, was doubtless suggested in consequence of those serious accidents

which are no longer possible at the present day. No one in fact at the present time has any apprehension of wounding the intestine in seven cases out of ten, but which M. Colliex states he has seen in many hospitals, (*Revue Méd.*, 1834, t. II., p. 20.)

VIII. When the case is one of *strangulation in the scrotum itself*, there is no need of making the incision of the hernial envelopes as high up as has been mentioned, but it ought to descend lower down. If on the contrary the case is one of *incomplete hernia*, the incision ought to be made to reach from the outer third of Poupart's ligament down to the root of the scrotum only. In this case our object is to divide successively the two layers of the sub-cutaneous fascia, the aponeurosis of the external oblique muscle, some of the fibres of the internal oblique, and finally the entire anterior wall of the inguinal canal. In inguinal hernias strangulated by the posterior ring, the incision should also be prolonged upwards to a great extent; but if they are not incomplete, it is advisable to prolong the incision moreover to a point sufficiently near to the extremity of the lower part of the tumor. If the case is one of *hernia of the tunica vaginalis*, we ought to avoid as much as possible giving this extension to the opening of the sac below, inasmuch as the testicle, after the reduction, would have too much tendency to escape from its position. In cases of hernia of the cæcum, the bistoury should rather be directed upon the inside than upon the outside of the tumor. After the sac moreover is laid open, we ought, should the viscera be found adherent or incapable of being reduced in consequence of the age of the hernia, to confine ourselves to destroying the obstacle to the progress of the matters, to keeping the belly in a depending position, and to bringing back gradually the displaced organs towards the ring. (See *Hernia in General*.)

IX. Upon the supposition that we have operated in order to remove the difficulties produced by a strangulation of the spermatic cord, there would, after the debridement was effected, be nothing more to do. In cases of hydatids and adipose tumors we must have recourse to the excision of the morbid parts, and the same must be done in respect to lymphatic ganglions, if any of these should chance to be developed in the inguinal canal. A more embarrassing case is that in which *the testicle is present in the interior itself of the ring*. It almost always happens in such cases that the testicle is changed either in its conformation or structure. If it is excised the patient finds himself deprived of an important organ; if we confine ourselves to the removal of the strangulation and the testicle cannot descend, the same accidents may be reproduced. Before the operation it would be so much the more difficult to pronounce with certainty, inasmuch as a true hernia in a person with but one testicle (*chez un monorchide*) may manifest itself in the place of the one gone, an example of which has been met with by Fages. It remains therefore for the practitioner to determine by the arrangement of the parts and the particular circumstances in which the patient is placed, the course which it is most advisable to pursue.

X. As to the mode of *dressing* and the *treatment subsequent to the operation*, they should be based upon the same principle as after the operation for hernia in general. I would only add that there is no operation in which immediate union presents fewer advantages or

exposes to as many inconveniences as it does in strangulated inguinal hernia. It is true that it succeeds sometimes, as the practice of M. Serre and that of the English surgeons sufficiently establish the fact; but the transformation of the sac into a vast abscess, leading to a supposition of the reproduction of the hernia and producing effusions of pus into the belly, and those cases of erysipelas and purulent collections mentioned by authors, and especially by M. Key, what are they imputable to unless to those attempts at union by the first intention? In cicatrizing the wound by second intention we avoid this description of accidents, and we have moreover, as I have mentioned, a possible chance of closing up the hernial canal radically. If after the operation of inguinal hernia, the inflammation and the suppuration ascend along the cord towards the supra-pubic canal, spreading under the skin of the iliac region rather than in the direction towards the thigh or perineum, this result is owing to the fact that the sub-cutaneous fascia, which is very adherent below, becomes thinner and thinner as it ascends upon the abdomen.

C. *In woman* the operation for inguinal hernia is attended with but very little difficulty; and we proceed moreover in the same manner as in man, except that we have nothing to fear from the lesion of important organs before we reach the sac. From the absence of the spermatic cord the only thing to be attended to in these cases is, to respect the intestine and the epigastric artery, which moreover are avoided by means of the precautions mentioned in speaking of inguinal hernia in man. If in this hernia the ovary should be found to be arrested at the ring or to have descended into the labium majus, examples of which have been related by Priscien, (Peyrilhe, *Hist. de la Méd.*, p. 715,) Veyrat, Pott, Lassus, Haller, Lallemand, M. De-neux, and M. Cruveilhier, (*Arch. Gén. de Méd.*, 2e sér., t. IV., p. 275,) prudence would suggest, however slightly the accidents may appear to be connected with its presence in the ring, that we should proceed to its removal. The uterus, fallopian tube and bladder should be reduced in the same way as the intestines, or would not fail to become subsequently reduced of themselves.

[*Inguinal Hernia*.—Sir Astley Cooper was so fortunate in one of the last cases that received the aid of this illustrious surgeon, as to effect the cure of an artificial anus resulting from the mortification of the gut of an inguinal strangulated hernia, which suddenly made its appearance in a woman aged thirty-four, at the third month of her pregnancy, and for which the surgeon operated. The fecal matters, which at first flowed through the wound, soon resumed their natural course, when the parts healed up kindly. (*Provincial Med. and Surg. Journ.*, April 15, 1841.)]

*Radical Cure of Inguinal Hernia by the Seton.*—Dr. Moesner (*Medizinisches Correspondenz Blatt*, in the *Journ. des Conn. Méd.-Chir.* de Paris, Janvier 1, 1846, p. 28,) has already obtained a radical cure of inguinal hernia in four cases, by the following process: he raises up the scrotum and sac by means of a thread, introduced on a species of *sonde à dard* of his invention, which is a curved canula, mounted on a hollow handle, and terminated by an olive-shaped button of the size of a pea, and which is also hollow. By means of a stylet adapted to the curvature of the instrument, and a

needle, furnished with a thread, which he can pass through the olive button, he causes the skin of the invaginated scrotum, and also the inguinal canal and the skin of the belly, to mount up into the interior of the canula. The thread, having been introduced with the precautions necessary to avoid wounding the viscera, is left in the wound to perform the duty of a *seton*, and not for the purpose of retaining the invaginated scrotum, as in the methods denominated those of invagination. The inguinal canal is then compressed and the patient kept in bed eighteen to twenty days, a period usually sufficient to cause an adhesive inflammation of the whole canal, after which the thread is withdrawn. The compression is afterwards continued as a precautionary measure, by means of a truss, for some weeks.

*Large Reducible Hernia.*—Mr. Bourne, of Bath, (Eng.) successfully operated for inguinal reducible hernia on the right side, of very large size, which had existed for fourteen years in an old sailor aged seventy, paralyzed on that side. The firm and old adhesions of thickened omentum to the sac, allowed of no other resource for the strangulation than the operation. (*Lond. Med. Gaz.*, May, 1846, pp. 882, 883.)

*New species of Inguinal Hernia.*—At the sitting of the Royal Academy of Medicine of Paris, December 8th, 1840, (*Arch. Gén. de Méd. de Paris, 3e sér., t. X., 1841, pp. 107, 108,*) our author, M. Velpéau, exhibited an anatomical specimen presenting a new variety of inguinal hernia, which authors have not mentioned. The intestine instead of descending through the inguinal canal, has made a passage for itself through an aponeurosis, between the outer border of the rectus abdominis muscle and the umbilical canal. T.]

## ARTICLE II.—CRURAL HERNIA.

Crural hernia has hardly been distinguished from inguinal hernia except since the time of Barbette, Nuck and Verheyen. Its natural seat is the fold of the groin, and the opening which admits of its passage, is known under the name of the *crural ring or canal*.

### § I.—Anatomy.

The crural canal, constituting a communication between the inner side of the iliac fossa and the inguinal depression, represents a sort of funnel, the base of which would be situated in the pelvis and its point on the thigh. Its upper opening, measured transversely, has a diameter of about two inches, and in women frequently two inches and a half. From before backwards, in its greatest diameter, it has but from ten lines to an inch, when it afterwards becomes narrowed as we recede from its middle portion. In its natural state it is divided into two portions by the crural vessels, in such manner that from the iliac fossa we should reach it through two small fossæ, which I would denominate *crural fossettes*, one internal, the other external, and which must not be confounded with the *inguinal fossæ*, which I have mentioned farther back. Its *internal portion*, which is the largest, forms what has been specially described under the name of the *crural ring*. Its limits on the inner side are the

concave border of Gimbernat's ligament; in front, Poupart's ligament; behind, the ilio-pectineal crest; and on the outside, the crural vein, the artery of the same name, and the epigastric artery. It usually contains a lymphatic ganglion separated from the vessels by a sort of partition, a prolongation of the fascia propria, and some adipose cells which almost completely close it up. It is this crural ring which gives passage to the viscera in crural hernia. Also its *external portion* is triangular; in its ensemble, then, it constitutes a large and nearly elliptical opening, formed above by the abdominal branch of the ilio-pubic band, below by the iliac branch of this same band and by other intercussating fibres. Its internal angle is rounded off by Gimbernat's ligament, while its external angle continues quite acute. The femoral vessels divide it into two unequal halves. In the direction of the thigh this opening is continuous by means of a fibrous expansion with the whole extent of the crural canal, under the form of a cone, the apex of which terminates upon the external tunic of the vessels, on a line with the entrance of the saphena into the crural vein. *The walls of the crural canal* are formed by the femoral aponeurosis.

Viewed on the outside this aponeurosis is found to be wanting; its superficial layer passes in front of the crural vessels, and assists, where it attaches itself at its apex very near the supra-pubic spine, in contributing to the formation of Gimbernat's ligament. It is triangular or falciform, and one of the borders, viz., the superior, is attached to Poupart's ligament. Another, which is the external border, is its point of origin. The third, representing a species of arcade, circumscribes the upper and outer part of the inguinal opening of the *fascia lata*. The *inguinal opening* of the crural canal, the internal and lower half of which resembles rather a gutter, has an oval form with its large extremity outside or below, and its point at the external border of the ring of the obliquus externus muscle. Viewed in the direction of the pubis, this opening is turned round at first into a semicircle to the outside and below, in order to mount up afterwards from without inwards, and then from below upwards, as if its point of termination was about to glide under its place of origin; in such manner, in fine, as to form in its totality a spiral convolution, and to make its axis fall obliquely from within outwards, upon the antero-posterior axis of the thigh. As lamellar tissues, which are a sort of attenuation of the *fascia lata*, fill or shut it up in quite a solid manner, many observers have been induced to believe that it does not in reality exist; but in taking the saphena for our guide we always meet with it, provided we leave out of consideration the reticulated membrane or species of cribiform layer which conceals its shape. *The posterior wall* of the crural canal is formed by the deep-seated layer of the *fascia lata*. Its *external side*, which is about two inches and a half long, and oblique from above downwards, and from without inwards, is made by the separation of the two layers of the *fascia lata*. Its *internal side*, which does not, properly speaking, exist, extends only from the pectineal crest, or Gimbernat's ligament, to below Poupart's ligament. The notch of the superficial layer of the aponeurosis replaces it in this direction. Its lower orifice leaves uncovered a portion of the vein, and incloses deep-seated lymphatic

ganglions, and especially cellular tissue, which unites the sub-cutaneous *fascia* to the sub-peritoneal *fascia*. This canal, which is an actual continuation of the iliac fossa without the viscera, peritoneum, infundibulum and *fascia propria* which occupy that, passes under the internal half of the femoral arcade, and is directed towards the thigh, forming a passage, whose anterior wall is to a great extent wanting in order to receive the saphena vein, and ultimately becoming continuous below with the sheath of the sartorius muscle. It is thus easy to comprehend how matters effused into the abdomen, between the peritoneum and the aponeuroses, may be transported into the groin, produce an infiltration of the limb, and give rise to abscesses by congestion, which might mislead to the supposition of a hernia or some other tumor.

### § II.—Formation of the Hernia.

From the space which exists between the superior spine of the ilium and that of the pubis being more considerable in women than in men, femoral hernia is much more common in the first sex than in the other. Another anatomical reason powerfully contributes in increasing this relative frequency of crural hernia in women. The inguinal canal, which is very narrow in this sex, has no scrotum which prolongs it to the exterior. The viscera being incapable of making their escape through this, as in men, are on the contrary, thrown back into the crural fossette of the iliac region, and come out with more facility through the femoral canal.

I. The hernial sac, already lined by the *fascia propria*, in passing through the crural canal crowds before it and appropriates to itself the greater portion of the cellular tissue which it finds there, and even envelopes itself with it in leaving the *sub-cutaneous fascia*, and for the same reason pushes downwards, inwards or outwards the lymphatic ganglions, which in certain cases it merely raises up, and which in this manner continue to rest upon the tumor. The hernia being once formed, has a tendency to be directed towards the external and superior part much more than in an opposite direction, which is owing to the greater adhesion of the *sub-cutaneous fascia* inwardly, or upon the outside and below, than in the direction of Poupart's ligament. This has existed to such a degree that crural hernia has been seen to be directed in this manner as far as to two or three inches in the direction of the os ilium. Instances of this kind have been related by Arnauld and M. Larrey. The sac runs along the inside of the femoral vein and artery. At its upper portion it is in connection with the origin of the epigastric artery, which crosses its anterior and external portion. In man it is crossed obliquely by the spermatic cord, from which it is separated only by Poupart's ligament.

The *epigastric artery* may take its origin at an inch or an inch and a half higher than usual, as it may also be given off by the femoral artery; from whence it happens, that in the first case, this branch might be pushed back to the inner side of the hernia in place of remaining outside of it, and that in the second case, the debridement on any point whatever of its external half, would almost inevita-

bly divide it. A second variety, which is more remarkable, is the one which I have already indicated, and in which the epigastric artery is seen to arise from the obturator, at more than an inch distant from the external iliac, as has been noticed by M. Hesselbach and an instance of which I have also met with. There can be no doubt that in this case the crural hernia would be found upon the outside, and the same thing would take place if the vessel in question took its origin from the hypogastric, as I have seen it do. A much more dangerous arrangement still would exist if the hernia should form in persons who have at the same time two epigastries, one originating from the iliac and the other from the pelvic artery, as was seen in the individual whom I mentioned above. In man especially, the neck of the sac would then have the pelvic epigastric on its inside, while the iliac epigastric would be on its outside, and the spermatic cord in front. Another *anomaly* is the one, for the knowledge of which we are indebted to M. Michelet, that is, where the internal circumflex of the thigh arises from the epigastric itself. The artery in this case might be found in front of the body of the hernia, cross it obliquely from without inwards, and reach the abductor muscles of the thigh. But the variety which is most frequently mentioned, is that in which the obturator and epigastric arise by a common trunk from the external iliac. It is in fact the most frequent. The examinations which I have had it in my power to make of it on several thousand dead bodies, either in the hospitals, amphitheatres of dissections, or at the school of practice, do not permit me to assert that it is met with in one case out of three or five or even ten, but only once in every fifteen or twenty instances. It is an arrangement, moreover, which is much more simple than is generally supposed. Before birth, the obturator artery arises almost constantly by two roots, one from the hypogastric, the other from the epigastric. But by the law, the epigastric root is soon obliterated, while the hypogastric continues, and forms in fact the vessel. When the contrary takes place, the anomaly in question is noticed. Many practitioners have supposed that in such cases, the neck of the crural hernia would have the epigastric artery upon the outside, and the obturator in front and within, in such manner as to be almost completely surrounded by an arterial circle. Even if this were possible, it would at least be a very rare occurrence. These arteries take their respective position a long time before the period of any hernia whatever. As the epigastric trunk is placed between the peritoneum and the *fascia transversalis*, or the ligament of Poupart, the obturator, should it arise from it, would be necessarily situated in the substance of the *fascia propria*. To reach the infra-pubic opening, it would be necessary that it should follow the lower semi-circumference of the crural ring. The viscera in escaping, and thereby necessarily crowding it backwards almost unavoidably, do not appear to incur any risk of bringing it upon their anterior surface. Up to the present time, moreover, I am not aware that there is any positive evidence from examinations of the dead body, that it has been wounded during the operation, though many persons have stated that this result has taken place in those who continued to survive. For the reason alone, that the iliac artery on arriving at the

ring, divides this opening into two halves, and that the epigastric artery is given off from its inner or anterior side, there must necessarily exist a point which has but little resistance upon the outside of the latter vessel. In directing the finger on this point, we soon perceive in fact that it is possible to pass by that route from the interior to the exterior of the belly, from whence it would appear to result, that hernia might sometimes take place on the iliac side of the epigastric vessels. We might therefore admit the possibility both of an *external* and of an *internal crural hernia*. An instance has been related by M. Cloquet, and another was shown to me by A. Thompson. It is true that Arnault, and the greater part of the pathologists of the last century, together with Sabatier and M. Walther, do assert that the intestine in coming out of the abdomen, passes from without inwards, over the anterior surface of the crural vessels, and they consequently leave it to be inferred that the epigastric artery remains on the inner side of the neck of the sac; but on this point they confine themselves to bare assertions, and there is no evidence to show that they have positively ascertained the fact by dissection.

II. Femoral hernia is not enveloped in as many tissues as bubonocle. We find here nothing more than the peritoneum, the *fascia propria*, the fascia superficialis, and the integuments. Moreover, it is in that intermediate layer which lies between the skin and serous envelope, that we meet with those lymphatic ganglions, sound or diseased, hypertrophied, indurated, or congested in any way whatever, or inflamed or in a state of abscess, with those hydatid cysts and those inflamed and cold or congested abscesses, which sometimes surround a crural hernia, in such manner as to render its diagnosis so difficult and the operation so delicate. It was in this part doubtless that the pus accumulated in the two cases of cold or congestive abscesses mentioned in the thesis of M. Bayeul, and which led to the supposition of the existence of a hernia. It is in this layer also that we find the veins which return from the integuments of the abdomen as well as their corresponding arteries, and it is here that are seen those adipose tumors and growths of every description which I have mentioned while speaking of hernia in general. As to the saphena vein, though situated in this intermediary layer, it is always crowded behind and below the tumor.

### § III.—*Strangulation.*

The opening which gives passage to a crural hernia, is so firm and solid, and the tissues which receive and envelope it at the thigh, oppose to it in general so great a degree of resistance, that it rarely acquires any very considerable size. Being obliged to traverse an orifice which is deeply situated; liable to be arrested in the canal itself, either above, at its middle, or at its femoral orifice; or to make its escape through a rent in Poupart's ligament, as has been seen by M. J. Cloquet, or through an opening in Gimbernat's ligament, as I have seen in the pelvis of a woman operated upon by M. Laugier, the diagnosis of the existence of this hernia in persons who are fat, and particularly in women, in whom it is so common, is frequently attended with a good deal of difficulty. It is readily perceived that

the same arrangement renders the operation more laborious than that of inguinal hernia. It is moreover owing to this narrowness of the passages, and to their slight degree of distensibility, that this hernia becomes strangulated with so much facility, and that it is so difficult of reduction as soon as the slightest degree of constriction exists. In its interior have been found the same organs as in the inguinal, together with the same anomalies and the same pathological alterations. Though experience establishes that its sac, which is generally thinner than in oschocele, does not usually contain but a very small quantity of serum, frequently a few drops only, and sometimes even none at all, there are nevertheless examples in which it has been found there to the amount of over several ounces, that is to say, in great quantity, as I have seen in supra-pubic hernia. In a woman whom I operated upon in 1836 at the hospital of La Charité, the sac contained nearly two tumblers of serum. M. A. Bérard (*L'Expérience*, t. III., p. 216) has since noticed a similar fact in a lady who died from hernia of the fallopian tube. It is moreover in the vicinity of crural hernia that I have most frequently met with those adipose layers and productions which have been described farther back.

#### § IV.—*Operation.*

Kelotomy at the fold of the groin requires still greater precautions than that at the scrotum; in the first place, because we arrive more suddenly down on the sac when there is no complication, and because in the contrary case we have to distinguish all the diseases which may be developed in this region, from hernia properly so called; again, because the sac being very thin and frequently confounded at its external surface with the cellular tissue, is readily opened before we are aware of it, and because from its containing scarcely any serum we may easily wound the intestine; in the last place, because we have to act at a great depth and to divide the stricture through parts which are almost invariably surrounded with vessels.

A. *The division of the integuments* should, or almost always may, be made in the direction at the same time of the inguinal groove and the great diameter of the tumor. A simple incision in general answers; nevertheless if the hernia should be of large size, and difficulty should exist in laying bare its neck, there would be no objection to our transforming this first division after the manner of Boyer, into a T incision, by directing the bistoury subsequently upon its upper or lower lip, according as there may exist a necessity of laying bare the inner or the outer side of the canal. Moreover there would be no reason why we should in all cases make a T incision, the vertical branch of which should be directed upwards, as is recommended by M. A. Cooper, in order to run no risk of wounding the internal saphena vein. The crescentiform incision would be preferable. The Crucial incision moreover, as recommended by Pelletan, and which Dupuytren frequently used, can be but seldom required. If however we should decide upon having recourse to it, the apprehensions of the English surgeon in regard to the saphena, need not in any manner deter us, for this vein is always placed below and behind the hernia.

B. After the opening of the sac it is, as Boyer remarks, as rare to find ourselves enabled to reduce the organs without debridement, as it is common to see the intestine excoriated, ulcerated, or even perforated in the portion which sustains the strangulation. The constriction being in general caused by the cutting border of the falciform or cribiform fold of the *fascia lata*, it is the circle of the intestine embraced by these two parts which we must first examine. The ulceration existed in this place in the patient operated upon in my presence by M. Wessely, also in the women whom I have operated upon myself, and upon several of the individuals operated upon by MM. Roux, Boyer and Lawrence, as I have already mentioned.

C. It was in consequence of the dangers of debridement in crural hernia, especially, that dilatation was suggested. Upon the outside it was said you will have the epigastric artery, above the spermatic cord, and on the inside, you will wound the obturator, if it originates from the epigastric. Happily these dangers are infinitely less in practice than in theory. Sharp divided the stricture upwards and outwards, and though he operated upon a great number of persons, we do not find that he wounded the supra-pubic artery, the ligature upon which, moreover, he considered a very easy matter. Pott divided upwards, and the spermatic cord does not appear to have been wounded by him. From the time of Gimbernat most surgeons divide upon the inside, and there is nothing to show that by this mode the infra-pubic branch has been frequently wounded. It is sufficient, however, that the thing is possible, to induce the practitioner not to neglect the means by which the wounding of this artery may be avoided with the greatest certainty. M. Jacquier d'Ervy and M. Pigeottes de Troyes (communicated by M. Jacquier, 21st March, 1839) have each lost a patient in consequence of wounding this vessel. The process of Sharp is evidently the most objectionable of all. Dupuytren, who appears to have reproduced it, and to have followed it in his practice for a long time, has modified it in such manner that it no longer possesses the same dangers in such cases. It was upon the external border of the opening at which the saphena vein enters, that is, at the opening of the *fascia lata*, that this surgeon directed the cutting edge of his convex bistoury, in such manner that he divided the tissues from before backwards, or from below upwards, and in this manner destroyed the strangulation before arriving at the place in which the artery to be avoided is situated.

I. The *debridement upwards* and slightly inwards is unattended with any danger in women when there is no anomaly in the vessels. In man, on the contrary, it might expose to the risk of wounding the spermatic vessels. Arnault states that he was witness to an operation, in other respects well performed, but from which the patient nevertheless died in consequence of a hemorrhage from the spermatic artery. Scarpa especially endeavored to demonstrate that it is almost impossible to divide in this direction without meeting with the accident pointed out by Arnault. Experiments undertaken by this last mentioned surgeon, in presence of Bassuel and Boudon, would go to show, in fact, that by dividing Poupart's ligament from below upwards to the extent of two or three lines, we almost inevitably wound the spermatic artery. Accident or other circumstances have misled

these surgeons. In the first place, it is incorrect to maintain that the spermatic cord lies immediately upon the bottom of the groove of Poupart's ligament. Some fleshy fibres and cellular tissue, occasionally in considerable quantity, usually separate them. It is not under the border of the internal oblique muscle that the cord passes, but in fact between its fibres. Moreover, this ligament, at the inner half of the ring, has a height of four to five lines.

II. *Outwardly* we could divide it entirely, which is never indispensable, without incurring any risk. Though when there was given from six or eight to ten lines to the debridement, the danger which gave so much alarm to Arnault, Scarpa and other modern surgeons, could not be denied, at the present day, when we generally give it only from two to three lines, such fears have, in fact, but very little foundation. The case related by M. Lawrence would furnish, moreover, an additional proof of this, for, notwithstanding the complete division of the external border of the obliquus externus muscle in the case which he speaks of, the cord was not touched. Moreover, can it be that an artery of such little importance as the one which comes from the epigastric to the scrotum, or the spermatic artery itself, can be of a nature to give rise to so serious a hemorrhage? Besides, it would be upon the outside of the peritoneum that such division would be made, and upon this supposition we cannot perceive how there could be any difficulty in obliterating it, either by a suture, ligature, tamponing, or compression. Finally, was not Arnault himself deceived? and was it in fact the hemorrhage which caused the death of the individual in the case which he mentions? Were there not in this case some particular circumstances which he had omitted to mention?

III. *Gimbernat*, whose labors had already been made known by M. Parcet e Venualés in 1807, having studied with more attention than his predecessors the anatomical arrangement of these passages, considered that we might avoid the danger of the process of Sharp, and the lesion of the cord, by dividing the stricture inwardly. His object being to separate, by means of the curved or straight bistoury, the triangular expansion which has received his name, from the lower border of Poupart's ligament, he directs his instrument to the upper part of the inner semi-circumference of the ring, and afterwards carries it obliquely inwards and downwards, as if for the purpose of reaching the pubis by following the course of the external border of the inguinal canal. In this manner, he says, we are certain to avoid the epigastric artery and the spermatic vessels. Scarpa and the moderns assert that we might also, in the same manner avoid the obturator when it comes from the supra-pubic artery, provided the incision followed in some respects the same turn which the vessel makes; but to obtain this advantage it would be necessary not to divide the ligament of Gimbernat transversely upon its middle portion, and still less to do so obliquely, from below upwards, while grazing the body of the pubis, as a considerable number of French surgeons appear to have understood this direction, and as they daily practise. Though this method may be preferable, what we have said above of the varieties which have already been frequently noticed in the epigastric and obturator vessels, proves that it does not completely secure us from hemorrhage. We should even incur

considerable risk of this result, if the epigastric artery, or one of the epigastrics when there were two of them, should be found situated upon the inside of the neck of the sac, and also in the event where a large sized branch proceeding from the internal iliac vein or from the hypogastric vein, should also ascend upon the inside of the ring, in the manner pointed out by M. Manec in his thesis, and as M. Ménière also states he has seen it.

IV. In this respect the débridement upwards is perhaps the one which would protect us, with most certainty, from the danger of wounding the arteries, especially if, as is recommended by *M. Manec*, the bistoury should be directed to the upper angle of the ring, in order to make a partial division of Poupart's ligament perpendicularly to its axis. Some persons, moreover, object to the débridement inwards from its exposing us to the risk of wounding the womb and the intestines in pregnant women, or the bladder when it is distended with urine. Hey, who cites a case of this last description and who had never wounded the epigastric artery nor never seen it wounded, concludes therefore, notwithstanding the remarks of A. Cooper, that it is generally better to incise the ring upwards and outwards, in the manner practised by Sharp; but it is evident that a careful surgeon may always avoid, without any difficulty, both the bladder and the uterus, so that did not the process of Gimbernat involve other dangers the objections of the skilful practitioner of Leeds would be of very little value. The circumflex artery arising, by some anomaly, from the epigastric or vice versa, in such manner as to pass in front of the hernia, is the only one which we are utterly unable to escape wounding, unless we should have had it in our power to recognize it while laying bare the sac; fortunately, as its division would be made very near the outer surface, it could easily be seized and tied.

V. *Process of the Author.*—In conclusion, the most certain method, in these cases, of effecting the débridement without danger, is to incise successively, on several points, the sharp border of the crural canal, to the extent only of one to two lines for each division. The anatomical arrangement of this passage, and the operations which I have already performed, induce me to believe that the constriction there is always caused by the free border of the falciform process, the concavity of Gimbernat's ligament, or the neck of the sac, and scarcely ever by the upper ring, properly so called; so that it will almost always be found that we can effect the débridement required, by incising the lower opening of this passage upon one or several points, and without the necessity of directing the bistoury into the abdomen. Having almost constantly divided the stricture in this manner since 1831, I have been enabled to satisfy myself that it is the most certain process. The blunt-pointed bistoury directed from within outwards or transversely, and from below upwards, upon the fibrous ring, would have to divide the entire base of the falciform fold of the aponeurosis and the whole thickness of Poupart's ligament, before running any risk of wounding the epigastric vessels. It is the only kind of incision which has nothing to fear from anomalies in the course of the arteries, and which enables us, without any difficulty, to obtain a débridement of from six lines to an inch in extent. If this opinion is not adopted, the débridement will have to be performed

according to the rules laid down by the surgeon of Madrid, or if we are no longer disturbed by the apprehension of wounding the spermatic cord, it may be made from below upwards.

D. An operation of kelotomy performed at La Charité in the time of Boyer, proves, nevertheless, that the debridement inwards may be followed by hemorrhage. Arterial blood flowed in large quantity through the wound, and an assistant was obliged to apply his finger to the bottom of the ring in order to make compression from behind forwards. Boyer immediately had recourse to the introduction of a small linen sac passed as far as into the iliac fossa, and which being afterwards filled with lint served as a substitute for the finger of the assistant. This application was not removed until at the expiration of five days. The hemorrhage did not reappear, and the patient was completely restored. To assert what artery had been divided would in my opinion be a difficult thing. Was it the obturator coming from the epigastric? It must then be admitted that it had passed above the neck of the hernia. Was it the epigastric or an abnormal epigastric, as in the case of Lauth? Was it not rather a small branch which is usually sent off by the supra-pubic artery behind the symphysis, and which, from having been more developed than usual, had given rise to this accident? On this point we can form conjectures only.

E. The relations of the vessels with the neck of the sac would render a mistake so dangerous, if, as has been seen by Richter and A. Cooper, an inguinal could be mistaken for a crural hernia, and vice versa, that the surgeon should never lose sight of them. A crural hernia pushed back in front of the inguinal canal by ancient cicatrices in the fold of the groin, as has been seen by M. Boulu, might so easily deceive on this subject, that a debridement outwards as in bubonocele would expose the epigastric artery. M. Roux, who divides the stricture like Gimbernat, considered himself very fortunate in ascertaining by dissection that an inguinal, which he had mistaken and operated upon for a crural hernia, had protruded upon the inside of the artery, and was in fact direct or internal. Had not Pelletan in a similar case discovered his error upon arriving at the viscera, it is quite probable that chance would not have served him so good a turn and that the epigastric artery would have been exposed to the greatest danger.

F. Two other methods of debridement for crural hernia have been proposed by MM. Else, Colliex and A. Cooper; I have already made some mention of them while speaking of hernia in general, and of inguinal hernia in particular. In the first of these methods the surgeon incises the aponeurosis of the external oblique above and in the direction of Poupart's ligament, separates the cord which he pushes aside inwards and upwards, penetrates down to the peritoneum, glides from behind forwards, or from the interior to the exterior a curved sound between the neck of the sac and the ring, and then divides the stricture without danger and to as great an extent as he desires. In the second method it is also necessary to divide the aponeurosis; but the debridement is effected from the exterior to the interior, though without opening the sac. These two processes, which were tested in several instances in the hospitals of London,

before M. Colliex had spoken of them, are attended with too many inconveniences to be generally adopted or to make it necessary for me to describe or to refute them in detail. To make the debridement directly backwards, as is recommended by M. Verpillat, and who advises that we should incise the pelvi-crural band, would answer only in certain cases, and would moreover be attended with too many difficulties to be adopted in practice.

[*Femoral Hernia with complication of foreign bodies and worms, in the practice of Dr. Proudfoot and Professor Mott.*—A remarkable case of *femoral hernia*, complicated with *foreign substances* occurred to Lawrence Proudfoot, M. D., of this city, (private communication from the author.) This surgeon thus describes it :

"On the 24th March, 1842, at 5 P. M., I was called to visit a maiden lady, aged 72 years, whom I found much debilitated, and laboring under symptoms of strangulated hernia, with hiccup and stercoraceous vomiting; upon inquiry and examination I found a tumor of the size of a hen's egg, covering Poupart's ligament on the left side, and a general tumefaction of the abdomen. By the application of pounded ice the tumor was somewhat diminished in size, and I employed the taxis as long as a reasonable hope and the safety of my patient admitted, but the extreme tenderness of the parts, the prostrate condition of the patient, and a continuance of those distressing symptoms attendant upon a strangulated hernia induced me to delay the means for her relief no longer, and at 10 P. M. the same evening I proceeded with the operation. The intestine had been strangulated about eighteen hours. There was an unusual quantity of fluid in the sac, for a femoral hernia; the intestine was in a good state to return, and the adhesions were slight and easily detached. I divided the stricture, and after gently drawing down the intestine, returned it and closed the wound with a suture and adhesive straps, applying a firm compress and a T bandage.

"In two hours the bowels were freely moved, and all unpleasant symptoms disappeared. On the fourth day I dressed the wound and it had all the appearance of doing well. On the sixth day, a profuse discharge of healthy pus took place, and at least a pint was discharged in twelve hours, which continued for three or four days, gradually diminishing. On the twelfth day after the operation the patient complained of a sensation in the wound as of the fluttering of a bird, and on removing the dressings, the poultice which had been applied the night previous was tinged with a bilious yellow color, and flatus escaped from the wound, which was followed in the course of the night by a faecal discharge.

"On the eighteenth day after the operation, on dressing the wound I discovered a black projecting point, and with a dressing forceps removed a piece of a sewing needle one inch and a quarter long.

"An artificial anus was the result, and a considerable portion of the contents of the bowels daily escaped from the opening, over which firm pressure was constantly made, and enemata daily used to solicit discharges by the natural outlet.

"The artificial opening continued about three months, at the expiration of which time it was permanently healed, and the discharges took their natural course.

"The calibre of the intestine at the aperture was much diminished, and there was at times a considerable collection of faecal matter in the colon immediately above it, but by gentle pressure and manipulating with the fingers the contents passed through the stricture, and the bowels were relieved.

"The needle is believed to have been in the system twenty years, as at that time her family remembered of her having swallowed the two parts of a broken needle; the piece taken out of the wound was the pointed extremity, and about two-thirds of the entire length.

"She had very frequently and for a long period complained of pain in her left side, but sought no other relief than was afforded by grasping the side and applying pressure. There was no swelling or attendant symptom whereby an abscess could be detected or suspected, and I know not how to account for the immense discharge, other than being the contents of a psoas abscess evacuated through the agency of the needle."

Dr. Proudfoot refers to the case of Dr. Mott, as follows:

"I may here make mention of a case which occurred in the practice of my preceptor, Dr. Valentine Mott, while I was his private pupil, and in which operation I had the great privilege of assisting. I believe the case has not been published, and as it may be considered as bearing some relation to the above, I will take the liberty of alluding to it. The patient was a lady of middle age and of robust constitution, who had a femoral hernia. The operation was performed by Dr. Mott, in his accustomed cautious manner, and with great elegance. The wound was closed by sutures, adhesive straps, compress and bandage, and on dressing it on the fifth day, a worm about four inches long, of the species of the lumbrixi, was discovered coiled up below the sutures and between the lips of the wound. The intestine was in a good state to return, there was not the slightest appearance of sphacelus or ulceration, and if it had been accidentally wounded by the knife, would have been immediately discovered by the bowel becoming collapsed previous to its being returned.

"The records of cases furnish examples where worms of this species get into the cavity of the peritoneum, or insinuate themselves into the bladder or vagina: the wound healed very kindly and the patient had not an unfavorable symptom.

New York, July 27th, 1846.

L. P."

### ARTICLE III.—UMBILICAL HERNIA.

#### § I.—Anatomical Remarks.

The umbilicus during life presents itself in its relations to hernia under two very different conditions. Before birth it is a slightly resisting ring, which is traversed at the same time by the three umbilical vessels and that prolongation from the bladder, known under the name of the urachus.

A. As soon as the infant is separated from its mother the parts contained in this ring contract and consolidate, and thus cease to fill it up entirely; hence it is through this part that the intestines, during

the first months of life, have a constant tendency to make their escape. Subsequently the ring itself, in its turn, contracts, closes up, and becomes attached upon the fibrous nucleus formed by the remains of the vessels; in such manner that the whole finally presents itself under the aspect of a very dense inodular cicatrix, so that in adults umbilical hernias no longer take place at the ring, properly so called, as in infancy, but by protruding through the aponeurotic fibres at the distance of some lines upon the outside of it.

B. We are to understand ourselves, however, when it is said that umbilical hernias do not take place through the ring *in adults*. If we reserve the name of exomphale to the hernia alone which pushes in front of it the cicatrix by dispersing or destroying it as it were, it is true that it is to be met with only in infants; because, in fact, it is not possible, excepting in so far as the various branches of the omphalo-placental cord have not yet been enabled to become consolidated together and transformed into a fibrous nucleus. But if it be conceded that there is an umbilical hernia in every case where an organ has escaped through the ring, which during fœtal life was filled up by the expansion of the vessels, there can be no doubt that such hernia is possible, and that it has been observed at every period of life. If in this case the cicatrix is usually deviated either to one or the other side of the tumor, this is owing to its always being a little less adherent upon some points of its circumference than upon others. Scarpa, however, relates that in one of his patients the sac was divided into several compartments by the ligaments of the umbilical nucleus. This fact, which I was the first to call attention to among us, has been since confirmed by the researches of M. Després (*Arch. Gén. de Méd.*, 2e sér., t. IV., p. 275,) and M. Cruveilhier. Moreover, as in this place there is no circle or canal naturally open, it is very natural that hernias should take place almost as frequently through a rent in the aponeurosis or linea alba as through the umbilicus itself; so that Monteggia, who was one of the first to declare that hernias in this region might take place external to the ring, was wrong only in stating that to be constant which is only very frequent.

C. However this may be, the viscera at this part never protrude except through a simple ring. There is no umbilical canal, and scarcely an instance is known in which the arteries have preserved their calibre up to adult age. According to the assertions of Haller, Boerhaave, and some others, the case is different with the vein, whose permeability, however, is so rare an occurrence that it need not disturb us during the operation.

D. As it is through a simple circular opening, and not along the track of a canal, that the viscera make their escape, umbilical hernia, unlike inguinal or crural, has no fibrous or serous sheath to strangle it at a certain variable distance from its root. The peritoneal layer which is found here, does not possess, or but very imperfectly, the characters that belong to it in hernias of the upper part of the thigh, and it is to exomphale that the remarks I have made on the subject of the absence of the sac while treating of the operation in general, are rigorously applicable. It is this which Lassus states that he found destitute in one case of envelope, or surrounded by such as were so attenuated, that he opened into the intestine, which had passed

through a rent in the epiploon. Upon the strength of a fact furnished by M. Pierquin, (*Journ. de Prog.*, t. XIV., p. 253,) this author also maintains that umbilical hernias are destitute of a sac. The external surface of this membrane, in fact, is so closely united with the surrounding tissues, that it is impossible to separate it from them. It was nothing else, in truth, but a portion of the peritoneum which originally lined that part of the ring, which the organs have pushed before them in forming the hernia. Having become enlarged by simple distension, in the manner of a cell of lamellar tissue, which is dilated in order to form a cyst, and not by the progression of, or traction upon, the abdominal peritoneum, properly so called, this sac cannot, as in the groin, be distinguished from the other tissues.

E. A peculiarity no less important in practice is this, that in umbilical hernia the sac scarcely ever contains any serum, from whence it happens that it is almost constantly found in immediate contact with the viscera. I would remark, however, that this law has been laid down in too peremptory a manner. In a woman whom I operated upon for strangulated exomphale, there were more than six ounces of reddish colored serosity in the interior of the hernial envelopes, and about three ounces were discharged in another case which was operated upon at Tours, in 1818, by Pipelet, and to which I was a witness.

F. The organs which may be displaced in order to form an umbilical hernia, are, according to the order of their frequency, the epiploon, transverse colon, small intestine, stomach, cæcum, sigmoid flexure of the colon, liver, and duodenum, and even the pancreas. These different organs are sometimes found in so great a number, and under the form of a mass so considerable, that their containing pouch becomes extremely attenuated, and to so great a degree even as ultimately to burst, as took place in the patient mentioned by Boyer, and whose life could not be saved by the operation. In more than one instance they have been seen, in the foetus especially, totally deprived of envelopes or only covered by an exceedingly attenuated membrane. Méry and Balzac have cited examples of this kind. I myself saw one at Tours in 1819, in the practice of Mignot, and M. Dupuy showed me another in 1835.

G. It sometimes happens, *but not always* as some facts at first induced me to think, that the digestive tube is sometimes lodged during the first periods of foetal life, in the root of the umbilical cord. Now if the intestines do not return, or only partially return before the end of pregnancy, the infant is born with an exomphale. The viscera in such cases would be enveloped only by the attenuated tunics of the omphalo-placental cord, and it may be easily conceived that distension might rupture this feeble partition in such manner as to expose the hernia completely naked. The same thing might also happen in the first hours or during the first days of birth. Under this point of view therefore, there is an essential difference to be made between umbilical hernia in the foetus, that of the first periods of extra-uterine life, and that of adult age. In the first, it is the natural tunics of the cord which form the sac and the envelopes; in the second, the cicatrix having had time to form, the organs in pro-

truding have become capped (se coiffer) with the peritoneum, integuments and intermediate cellular tissue; in the third, the sac, obliged to pass between the vessels or upon the side of the common knot which unites them, is moreover, in the majority of cases, compelled to lacerate the interior of the ring or the neighborhood of its circumference, in order to work out a passage for itself, and to arrive ultimately under the skin in gradually distending the corresponding peritoneum. An umbilical hernia, though very large, having been kept reduced, disappeared spontaneously in a new-born infant mentioned by M. Requin, (*Gaz. Méd.*, 1832, p. 640.) In an infant which I saw in 1837, in company with M. Delafolie, it had diminished to the extent of four-fifths of its dimensions, after a compression continued for two months. A ligature applied inadvertently upon the root of the cord, effected its strangulation in the cases related by M. Poussin, (*Journ. de Méd. et Chir.*, t. I. et II.,) Burret, (*Thèse*, No. 162, Paris, 1833,) and Brun, (*Ibid.*, No. 238, Paris, 1834.)

H. Frequently also the hernia takes place, in fact, at some distance from the umbilicus or in its periphery. So long as it is distant only one or two lines from this cicatrix, its texture, and the relative arrangement of its parts have nothing special; but if it is ever so slight a distance beyond this, its sac and cellular lining present themselves under different characters. The peritoneum, which is then more movable and less adherent, admits of being drawn upon and displaced without difficulty, and the hernia is found in this manner to be furnished with an unequivocal sac. From the *fascia propria* having partially regained its laxity and thickness, the sac may be distinguished from the external tissues, while fatty matter and serum sometimes accumulate within its lamellæ. Frequently also adipose tumors or hernias have been found to develop themselves around the umbilicus. Fardeau mentions an instance of one which was prolonged as far as the interval between the two layers of the suspensory ligament of the liver. M. Bigot, M. Ollivier d'Angers, and Béclard, as well as Heister, Petsch, Morgagni, Klinkosch, Pelletan, Scarpa, M. Lawrence, M. Cruveilhier, and M. Bérard, have also met with them, and I myself have frequently noticed others which had their root in the infra-peritoneal layer. I have dissected one also which was prolonged into the falciform fold of the umbilical vein. It was probably above this cicatrix, that the hernia mentioned by M. Cloquet, which had pushed before it, while *un-lining* it, the hepatic ligament to procure in this manner a sac, made its escape.

### § II.—*Operation.*

The operation for umbilical hernia is considered to be exceedingly dangerous, and in reality appears to be more so than that for inguinal or crural hernia. If we admit the fact, it is owing perhaps to our operating near the stomach or diaphragm, to the circumstance that the organs contained in the tumor are in immediate relation with the principal viscera of digestion, or because we do not decide upon the employment of the cutting instrument until at too advanced a period of the disease. Another reason would also be found in the fact that after the operation it is impossible to place the wound in a

depending position, and that the pus and other extraneous fluids are thus compelled to fall back into the peritoneal cavity.

A. If the tumor is of moderate size it may be laid bare by a simple incision parallel to the direction of the linea alba. In the contrary case there is no reason, whatever Scarpa may say on the subject, why we may not have recourse to the T, or even the crucial incision, but I prefer the one in the form of a crescent. In ordinary cases we give sufficient length to this incision to go a slight distance beyond the hernia at its two extremities. In this hernia the integuments are, in general, too much stretched, and would have too much difficulty in puckering up to require us to take the precaution to raise them before dividing them. We incise them, therefore, from without inwards in the same way as for laying bare an artery. The subjacent layers are also to be divided in the same manner, that is to say, by drawing the bistoury over them with all the caution requisite.

B. As it is not possible to *isolate* the sac, we could not lay it bare without difficulty if we persisted in dividing layer by layer, and en dédolant, on one point only, the layers which separate it from the skin. As, however, it is frequently very near the cutaneous envelope and does not usually contain but a very small degree of serum, we cannot observe too great degree of precaution in cutting down upon it. Tumors of different character may produce embarrassment here as well as elsewhere. In a woman whose case was communicated to the Academy, I was obliged to cut through a fibrous trilobate mass as large as the fist before reaching the intestine, which was found strangulated at its pedicle. From the moment when the bottom of the incision presents the appearance of being formed only by a very thin lamella, the instrument is to be used with a still greater degree of caution; as soon as the layer which we have divided is found to be separated from the parts which it covers by the slightest interval, the grooved sound is then to be glided underneath it, for we have now probably arrived in the sac. There will now no longer be any doubt upon this subject should the slightest quantity of liquid make its escape, or if, as has been observed in most instances, some adipose pelotons show a disposition to protrude through the opening. Once arrived in the interior of the hernial sac, the bistoury, guided by the forefinger, if we make use of the blunt-pointed bistoury, or by the grooved sound in the contrary case, immediately enlarges the first orifice and makes a free division of all the envelopes of the tumor.

C. It is in umbilical hernia, especially, that we meet with the epiploon, and in such manner as to form here, in some instances, a mass of considerable dimensions. We must not, however, allow ourselves to be imposed upon by appearances. We almost always find below it a noose of the intestine, which it envelopes in forming for it a sort of second sac. For the same reason we find in this hernia, more frequently than in others, that the intestine has lacerated its epiploic investment, passed through it and become strangulated in the ring itself which is the source of this hernia, and thus placed itself in immediate contact with the surface of the sac, properly so called.

D. After the opening of the sac therefore, the first thing to be attended to is to identify the arrangement of the displaced organs.

We therefore search with the finger for some portion of the epiploon which is not adherent, in order to raise it up and to unfold and spread it out upon one of the borders of the wound. The intestine, if there is any of it in the tumor, is then seen below it. In those cases in which this simple displacement of the parts will allow of their reduction, we must immediately proceed to this step. Hey, and since him almost all operators, have strenuously insisted that the reduction should commence with the intestine, and not with the epiploon as recommended by Pott. For the intestine being the last which has come out, and being situated at the greatest depth, and, in general, more easily pushed back, is the part, in fact, which ought to be first reduced. Nevertheless if a contrary arrangement should be met with, and the return of the epiploon be attended with less difficulty than that of the intestine, I can see no reason why we should persist in following the rule laid down by Hey.

E. When the intestine is gangrened, a circumstance which must be rarely met with, inasmuch as it is known, that mortification is infinitely more tardy in its development in hernias of the large intestine, and in entero-epiploceles, and especially in hernias purely epiploic, than in enterocele, we ought to recollect that stercoral fistulas, or an artificial anus at the umbilicus can scarcely ever be cured. This, as Scarpa has clearly established, is owing to the fact, that there is no membranous infundibulum formed behind the umbilical circle and at the expense of the sac. How, in fact, could such a formation take place, since the serous surface of the hernial pouch closely adheres to it, and is wholly formed and developed out of the umbilicus, and has not been borrowed from the interior peritoneum, as it is in inguinal and crural hernia? Gangrene or any perforation whatever, therefore, of the intestine appears to require, under such circumstances, that we should have recourse immediately to invagination or to the suture, and not attempt to establish an artificial anus. I would remark, however, that in the operation performed by Pipelet, and which I have mentioned farther back, a gangrenous eschar of the intestine was removed, and that a fistula was established, which being left to itself, ultimately closed up and cicatrized perfectly. It was, moreover, in a case of umbilical hernia that M. Chemery-Havé successfully performed invagination, and the remarkable operation related by Scarpa, who quoted it from the Ancient Journal of Medicine.

F. The debridement, when necessary, is so easy and attended with so little danger, that we scarcely ever dispense with it. We may make it almost upon this or that point indifferently. Cases might happen in which it would be possible to wound the liver, the umbilical vein or arteries, and even the urachus: but this could not happen, so to speak, unless we did it purposely, or unless such anomalies existed as are too unusual in such cases to render them the subject of apprehension. We must not, however, forget the abnormal veins mentioned by MM. Manec and Méniere, or those that I have myself mentioned. Though there may not be any more perceptible advantage in incising the umbilical ring below than in any other direction, I see no inconvenience in following the advice of authors who recommend for greater security, to direct the incision

upwards and to the left. The danger from incising largely of weakening too much the walls of the belly, and exposing the patient to an almost certain return of the disease, might, it seems to me, be easily avoided, if in place of making a single incision, and giving it half an inch in depth, we should make three or four of them at different points, and of one or two lines only in extent, as was done by me in the patient whom I operated upon with M. Gresely, and in several other instances; if, in a word, we should adopt the multiple debridement in umbilical hernia, in the same manner as in those which I have already spoken of.

G. Although there may not be in exomphale, properly so called, any strangulation by the neck of the sac, and that the ring which produces the constriction is almost constantly smoothly rounded, prudence, nevertheless, dictates that we should examine before proceeding to the reduction, what may be the condition of that portion of the intestine which has been strangulated. If we should decide upon operating without laying bare the whole tumor, after the method of Franco, Rousset or Pigray, we should particularly recollect that the ring is scarcely ever distinct from the neck of the sac, and that unless we combine the process of Bell with this method, as M. Raphael advises, we should not succeed in destroying the strangulation without penetrating at the same time into the interior of the sac. This process, therefore, is still less adapted to the umbilicus than to any other region, notwithstanding Scarpa recommends it with a degree of complaisance, and that M. A. Cooper had recourse to it successfully in two instances under such circumstances.

H. Immediate reunion might be attempted with more advantage and facility after kelotomy at the umbilicus than in hernias at the groin. The sac formed to some extent of a single layer, has less tendency to roll up on itself, and is much more inclined to readapt itself to the points which it primitively occupied. I would not venture however to recommend it, because in my view the radical cure after the operation is so much the more probable in proportion as the method of secondary intention is more completely carried into execution. Moreover, this is a part of the body where the organs stand most in need of being supported by a moderate compression after they have been returned into the belly, and this without doubt because the opening which had given passage to them is usually very large, and especially because it forms a ring or perfect circle, which traverses perpendicularly the abdominal enclosure.

#### ARTICLE IV.—VENTRAL AND OTHER HERNIAS.

##### § I.

*Hernias at the linea alba*, whether above or below the umbilicus, differ too little from those which I have just examined to make it necessary for me to enter into a special description of them. Should they become strangulated, moreover, a circumstance which has scarcely ever been heard of, the operation in these cases would have nothing special. The same must be said of the hernia at the flank, or *lumbar hernia*, mentioned by J. L. Petit, seen in one instance

by MM. Cloquet and Cayol in a man 75 years of age, in another instance by Lassus in a man who had one on each side, and also by Pelletan in a woman who had her belly at the same time covered over with ruptures. Nor do ventral hernias, properly so called, that is to say, those which are formed external to the linea alba and the umbilicus and other natural openings of the abdomen, whether by a simple *rent in the aponeuroses* and muscles, or in consequence of a cicatrized wound in those parts, as has been seen by Schmucker, Desault, Lassus, M. Richerand, M. Anderson, and many others, scarcely ever strangulate. If their strangulation does take place, it is at least almost always practicable to reduce them by means of the taxis, position, and other modes pointed out in the preceding articles. We find however that M. Key or M. Bransby Cooper, could not succeed in reducing a strangulated ventral hernia until after having had recourse to the operation as well as to the debridement, and that the patient was thereby restored. A hernia which had been caused by a rupture of the umbilicus during parturition, thereby became, says Bartholin, so enormous that the poor woman (Bartholin dans Bonet, t. IV., p. 410) was compelled to conceal it in a bag. Upon the supposition that all those varieties of tumors should require kelotomy, we should proceed in the same way as in cases of umbilical hernia, and they would require no other precautions than those which would be indicated by the track of the epigastric, lumbar or anterior iliac artery. M. Paccini, (*Gaz. Méd.*, 1833, p. 409,) in a case in which he was obliged to operate for strangulated hernia below the umbilicus, succeeded perfectly. M. Goyrand, (*Press. Méd.*, t. I., p. 487,) operating in a similar case, was no less fortunate. A woman whom I operated upon with M. Ducos, in whom gangrene had already taken place, and where the hernia was situated at four inches below the umbilicus, also ultimately got well. A hernia in the epigastric region, which I saw in a young girl, ulcerated and caused death, but the child was consumptive. The operation was completely successful in the case of M. Castellacci, (*Bull. de Fér.*, t. V., p. 175,) though the hernia was strangulated by a cicatrix. The same result took place in the patient of M. Aussandon, (*Thèse*, No. 276, Paris, 1834,) though the hernia was congenital and upon the inside of the antero-superior spinous process of the ilium.

## § II.

*Obturator Hernia, (Hernie Obturatrice.)* examples of which have been mentioned by Arnault, father and son, Duverney, Garengeot, Verdier, Pipelet, and Eschenbach, and which has since been seen by MM. A. Cooper, W. M ... (*Gaz. Méd.*, 1833, p. 576) Gadermann, (*Rev. Méd.*, 1825, t. IV., p. 128,) J. Cloquet, (*Thèse de Conc.*, 1831, p. 107,) H. Cloquet, (*Journ. de Corvisart*, t. XXV; *Bull. de la Fac.*, t. III., p. 80,) Hesselbach, Marechal, (*Journ. de Prog.*, t. X., p. 247, and t. XVI., p. 256,) and several others, (*Ibid.*, t. I., p. 263,) and which is a description of hernia which also appears to be sometimes liable to strangulation, would be somewhat more embarrassing. The opening which gives passage to it being then transformed into a sort of canal, whose pelvic orifice is formed by the pubis outside and above,

and by the obturator membrane throughout the rest of its extent, is found to be circumscribed by the tissues of the obturator muscles. In such cases the viscera are surrounded anteriorly by the pectineus muscle, behind by the adductor magnus, and within and above by the adductor brevis and adductor longus. (*moyen adducteur.*) An obturatic hernia being obliged to traverse these different muscles or to separate them apart in order to make its way to the inner and lower extremity of the fold of the groin, does not appear to be capable of becoming strangulated, except at its entrance into the obturator canal, as in fact was the case in the instances which have been related. It would appear that inasmuch as the infra-pubic artery must always be found upon its outer side, either above, below, or directly outwards, the debridement would have to be made at its inner semicircumference. I am aware that this operation was first attempted by Garengeot on one of his patients in the Rue de Sépulchre, and more recently by a German surgeon in a case nearly similar. But when we reflect upon the parts through which we should have to divide to reach the seat of the strangulation, and also on the depth at which the obturator membrane is situated, and the difficulty of ascertaining the situation occupied by the vessels, and also that the bladder or vagina might be wounded, I may be well permitted to dispense with recommending it. In the case of M. W. M., the strangulation was upon a small portion of the ileum, and in that of MM. Marechal and J. Cloquet, it was an entero-epiploic hernia. Gangrene had cribbled the sac in the case of M. Gadermann, and in another patient we perceive that the artery was found on the inside and in front. I have seen a fine example of this hernia in a specimen carefully prepared by M. Demeaux, an interne of the hospitals. In this case, the vessels being situated to the outside, and in front, might have been more easily avoided; but the intestine, which was a portion of the ileum, was so entirely concealed by the obturator extenus muscle, that it would have been impossible to have recognized the hernia during life.

### § III.

*Ischiatic, perineal, vulvar, and vaginal hernias* are alike exclusively comprised within the domain of pathological surgery, properly so called, and have no relation to operative surgery, excepting so far as the taxis, position, and containing means methodically applied, constitute the principal remedy. The eighteen instances also of perineal hernia, collected by M. Jacobson, (*Bull. de Fér.*, t. XIV., p. 207,) are not the only ones that science possesses, and the so called vaginal hernia operated upon by M. Pétrunti, (*Gaz. Méd.*, 1826, p. 424), might have been only a recto-vaginal abscess.

[*Internal hernial sacs*, of the appearance of *pediculated pouches*, filled with faecal matter, have been found (*Edinb. Med. and Surg. Jour.*, Oct. 1, 1845, p. 282) in considerable numbers *on the rectum and colon*, and were ascertained to have been true hernias of the mucous through rents of the muscular coat of the intestine.

*Diaphragmatic Hernia.*—M. Battalia (*Giornale delle Scienze Mediche, della Soc. Medico-Chirurg. di Torino*, Nos. April, May

and June, 1845; also *Gaz. Méd. de Paris*, t. XIII., 1845, Sept. 20, pp. 600, 601) furnishes a remarkable case of a patient aged twenty-nine, of robust constitution, who, owing apparently to a debauch and violent efforts in coition the night before, was seized with all the symptoms of strangulated hernia, as stercoral vomiting, &c., except the *absence of diffused abdominal tension, distension and pain*; the abdomen being in fact rather *drawn in*, or *sunk or flattened* in the direction towards the vertebral column; and affected only with a slight burning pain in the right iliac region. This dilemma and mystery for the diagnosis, was unravelled in a few hours by the autopsy, when the *entire stomach*, the *great epiploon* and a *part of the transverse colon* were found lodged in the thoracic cavity, having reached there through an oval-shaped transverse rupture in the diaphragm to the right of the oesophagus, and which was three and a half by two and a half inches in diameter. This had caused the strangulation and gastro-enteritic inflammation, the evidences of which were manifest upon the displaced organs, while those of the thorax were perfectly sound. There was on the right side of the thorax a cicatrix from a sabre wound, received some four years before; and as the edges of the rupture were somewhat *hard* and irregular, and as considerable adhesions were found between the peritoneum and viscera, and principally with the liver, which latter was enlarged, &c., the editor of the *Gaz. Médicale* seems inclined to the impression that the rupture, contrary to the opinion of M. Battalia, was ancient and from the wound, and not recent. The editor cites cases of *congenital diaphragmatic hernias*, which notwithstanding, admitted of the ultimate restoration of perfect health, (*Gaz. Méd.*, 1843, p. 192,) also of tolerable health persisting for years after such hernias from traumatic causes, (*Gaz. Méd.*, 1843, p. 776.)

*Statistics and causes of hernia.*—M. Malgaigne (*Leçons Cliniques sur les Hernies*, &c., in 1839–40, Paris, 1841) estimates the whole number of ruptured persons in France, in 1841, at *sixteen hundred thousand*, in a population at that time probably of about thirty-six millions. Of these the excess of males to females is as four to one. The most numerous cases are, as is well known, among laboring persons, but we cannot perceive for what reason *hernia* should prevail more among the descendants of one race than another. Thus the Celtic or Gallo-Roman races in the central provinces are pronounced most liable to hernia, while those of Brittany and the Cimbric, Norman, Germanic and Iberian races are peculiarly exempt! M. Malgaigne also advances an opinion diametrically opposite to the established one, viz: (see *Op. Cit. in Arch. Gén. de Méd.*, 3d sér., t. XII., p. 535,) that inguinal hernia, even in women, is more frequent than crural! In the work we have cited he appears to have furnished much useful systematization to the subject of *bandages* or trusses for hernias, among the infinite varieties of which he gives a decided preference to the *English bandage*, or that invented by Samson.

At Guy's Hospital at London, Mr. P. A. Poland furnishes 42 cases of hernia from September, 1841, to December, 1842. Of these 17 were inguinal and all in males; 24 crural, of which 19 were in

females; and of 25 strangulated, 19 were operated upon, of which 9 were cured and 10 died.

In connection with this subject the number of cases of *strangulated hernia* of all descriptions, treated at Wurtzbourg, from 1816 to 1812, was, according to M. Textor, (*Revue Médico-Chir. de Paris*, January, 1843,) 172: of which 98 were inguinal, 71 crural, and 3 umbilical. Of the whole number there were 105 cured by the taxis. Of 56 operated upon, 32 were cured and 24 died. Of the 71 crural, 65 were in women and only 6 in men. Of the 98 inguinal, 85 were men and only 13 women. The average mortality in operations for strangulated hernia at Wurtzbourg, was 3 out of every 7. T.]

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## PART SIXTH.

### ORGANS OF GENERATION.

#### CHAPTER I.

##### GENITAL ORGANS OF MAN.

###### ARTICLE I.—HYDROCELE.

The word *hydrocele*, in its literal acceptation, signifies any tumor formed by water; but it is only used in surgery for designating aqueous tumors in the scrotum. Hydrocele is a common disease, which is seen in both sexes at every period of life, and in all countries and at any season of the year.

###### § I.—*Hydrocele in Man.*

Authors admit two species of hydrocele in *man*: hydrocele of the scrotum, properly so called, and hydrocele of the spermatic cord. Hydrocele of the *scrotum* comprises two varieties, one by infiltration and the other by effusion. *Hydrocele by infiltration* is no other than oedema of the scrotum, and should be so denominated. *Hydrocele by effusion*, whether it be acute or chronic, has its seat in the tunica vaginalis, or in certain accidental cysts.

A. *Acute Hydrocele*.—I understand by *acute hydrocele* that which is developed in the space of a few days and accompanied with inflammatory symptoms in the scrotum. Though common it has generally been overlooked. Any external violence made upon the scrotum may produce it. I have seen two instances of it after a prolonged taxis, and the same result produced in three other patients from the operation for hernia. It is sometimes caused by the presence merely of a strangulated hernia. The same may take place from any acute inflammation whatever in the tissues of the scrotum; but it is nevertheless most frequently imputable to diseases of the testicle. I have met with it as a consequence in every variety of orchitis: thus,

orchitis from external causes, that from an interruption to the circulation, and also urethral or blenorragic orchitis, in fact no variety is entirely exempt from it. Acute hydrocele in cases of orchitis being the most frequent, I shall use that as its type. Many surgeons have mentioned it without apparently attaching much importance to it; but no person, I believe, before M. Rochoux, had maintained that "apart from the portion usually very small, of the tumor, which belongs to the epididymis, the remainder is formed by a peritesticular effusion which itself is caused by an inflammation of the tunica vaginalis," in the swelling which characterizes the disease known under the name of blenorragic orchitis. I have endeavored since the year 1833, to ascertain out of more than 200 cases affected with acute orchitis, either at La Pitié, La Charité, or in private practice, what is the actual physical or anatomical condition of the tumor. The result is a conviction on my part that, in urethral orchitis especially, the tumefaction is almost exclusively confined at first to the epididymis or vas deferens, that it then reaches the tunics of the scrotum and testicle, and finally that serosity in the tunica vaginalis also cooperates in producing it in a great number of cases. I may therefore add, from these facts, that hydrocele accompanies about one half the cases of acute orchitis; but M. Rochoux, in affirming that in this complaint the hydrocele is almost the whole disease and the engorgement of the tissues scarcely anything, has been most certainly deceived. The epididymis and the testicle form in fact, in general, the third half and sometimes two-thirds, four-fifths or five-sixths of the tumor; the thickened tunics of the scrotum also constitute one part, without counting that in many cases there does not exist any, or that there is but a very small quantity of serum around the testicle. When an actual hydrocele exists, it sometimes, though rarely, forms as much as one-half or two-thirds of the mass; ordinarily, however, it makes up from a sixth to a fourth of the tumor. Frequently it is reduced to a thick [?] stratum of a line or two in depth of liquid around the seminal gland. What has deceived and what will still continue to deceive on this point is this, that in acute orchitis the testicle and epididymis present a proportionate size and consistency altogether different from the normal state. The first of these organs, naturally of a soft or spongy tissue, and inclosed in a fibrous thick shell, being now swollen and dilated as it were by the disease, and embracing as it were the front part of the epididymis, so readily leads to the supposition of a collection of liquid that it is almost impossible not to be sometimes deceived by it. From the unusual expansion and hardness of the epididymis, which then has the form of an egg slightly flattened on its anterior surface, the testicle presents the appearance of a fluctuating tumor which is mistaken for the tunica vaginalis distended by a liquid.

Having fallen into this error myself, and having seen very expert practitioners also deceived in the same manner, I have thought it advisable to suggest the means by which we might avoid it, (*Dict. de Méd.*, 2d edit., Art. *Hydrocele*.) When there is a hydrocele, it is perceived that the external wall of the cyst is not obstructed by the testicle until after we have traversed, while depressing it, a species of void, cavity or middle portion, manifestly less resisting than the rest.

It is also perceived that this sensation is communicated upon the sides as well as on the front part of the tumor, because the tunica vaginalis envelopes the epididymis down to its root fully as much as it does the testicle. A great quantity of liquid sometimes causes the disappearance of the first of these two signs, but in such cases there can scarcely be any room for ambiguity. Ancient adhesions might obscure the inanifestation of the second sign, but they would render the other more clear. If both failed, it may be said that there is no hydrocele. I would add, that besides these signs, or the transparency, everything else is illusory. Acute hydrocele, constituting only a superadded symptom in orchitis, does not require any *particular treatment*. When, however, it continues after the resolution of the testicular engorgement, it is advisable to attend to it. It is to this affection that we may apply the topical remedies which have been extolled with the view of avoiding the operation for hydrocele in general. I procure relief to the patient at the present time by means of *puncture with the lancet*. This puncture, which I first employed in order to solve the question of effusion, empties the tunica vaginalis, assuages the pain, and constitutes the most powerful resolvent that I have met with in such cases, however acute the inflammation may be. I have now made use of it in more than a hundred instances, and I have never seen it produce any accidents. MM. Serre and Lallemand (*Petra, Thèse, No. 65, Montpellier, 1837,*) have also succeeded in certain cases of chronic hydrocele by means of these repeated punctures associated with an antisyphilitic treatment.

B. *Chronic Hydrocele*.—Children are less frequently affected with hydrocele than adults. In these last it is so common that I have met with thirty instances in less than a year's time at the hospital of La Charité.

I. *Causes*.—Irritations produced in the scrotum, cord or urethra are the usual causes of this complaint. Walking, riding, especially in hot climates, and all kinds of friction made by the thighs or by external bodies against the scrotum, may also produce it. It is thus frequent at St. Domingo and Martinique, and the West India colonies in general, and likewise among persons who ride. Another cause of hydrocele, which has been too much overlooked, is found in the diseases of the seminal gland itself. A great number of persons in fact have had an orchitis before having a hydrocele. Paying exclusive attention to the inflammation of the testicles, they suppose themselves cured when this ceases to give them pain, or when the organ has been reduced to a moderate size. Several months pass by without their thinking any more of it. During this time the slight irritation remaining in the scrotum excites an exhalation from the tunica vaginalis; a hydrocele is slowly developed, and when the patient notices it he no longer knows what to attribute it to. It is also very usual to see the testicle, and especially the epididymis, bosselated, hypertrophied, and double or triple its size, in hydroceles which are the most simple in their appearance, and which seem to have come on spontaneously. The progress of a hydrocele is usually quite tardy. If some patients state that they have seen it develope itself suddenly, this is because they have been almost always unconscious of its first stages, until chance suddenly draws their attention

to it. As for the rest, it rarely happens that it becomes developed in less than a month, or that it requires over two years to fill up the tunica vaginalis. Having reached this stage, it may remain stationary for several years. While, on the contrary, the sac which contains it still remains flabby, it may continue to increase. Finally, it invades the entire scrotum, makes traction upon the skin in the neighborhood, conceals and deforms the penis, and may acquire a considerable volume.

II. *The morbid anatomy* of hydrocele teaches us that the alterations of the scrotum vary according as the disease is recent or ancient. They are all referable to the effused matter, to the testicle and the tunics which form the cyst.

a. The *liquid in hydrocele* is usually a pure serosity, and of a slightly lemon-colored tint, like that of ascitic dropsy. Albuminous flocculi are sometimes found suspended in or mingled with it. It was lactescent in a patient whom I operated upon in the month of August, 1836, and perfectly green, or of a porraceous green in a patient of M. Salacroux. M. Bostock, who has analyzed it, has ascertained that it contains shining colored fibrils (paillettes) whose character he was not enabled to determine. There have been frequently found in it also concretions, sometimes free, at other times adherent, of a friable or fatty or mica-like matter, or clots of a fibrinous and cartilaginous appearance. It has appeared to me that such products resulted from a certain quantity of blood or some perverted albuminous matters. The *chocolate* matter which has been so much spoken of, indicates an ancient hematocele and not a hydrocele. Exclusive of a yellow, whitish, or greenish color, the changes in the liquid contained in the tunica vaginalis are imputable to the fact, that it has been mingled with blood, which in the course of time has decomposed or ceased to become recognizable.

b. *Thickness of the cyst.*—The plates or friable bridles of more or less firm consistence, and sometimes cartilaginous in their appearance, and which irregularly line the interior of the sac, and are often strongly adherent to it, are also the remains of effused blood and consequently of a former hematocele. False membranes that were purely of an albuminous character could alone belong to hydrocele, but they are uncommon. They are distinguished from the preceding in this, that they become organized in the manner they do upon the surface of the pleura, or are so intimately united with the tunica vaginalis, that it is next to impossible to isolate them from it, while the fibrinous concretions on the other hand may be detached without any great degree of difficulty. These are the tissues which sometimes transform the sac into a thick hard fibro-cartilaginous shell. It is nevertheless true, although this has been denied, that the tunica vaginalis itself and its immediate envelopes then actually undergo a certain degree of thickening by becoming blended with each other. It is also true that this species of lesion does not belong to hydrocele properly so called, but that it is a consequence or accompaniment of simple or complicated hematocele. In hydrocele, however voluminous it may be, the skin is but slightly attenuated, because the tumor in becoming developed draws upon the skin of the neighboring regions. The same thing takes place in respect to the super-

ficial sub-cutaneous fascia ; the dartos, which is the tissue we next come to, is sometimes attenuated ; while in other cases it becomes thicker and assumes a decidedly muscular appearance. The deep-seated sub-cutaneous fascia of the abdomen, the divergent sheath and that of the ring, which separate it from the cremaster, are in most cases, wasted, attenuated, or no longer recognizable ; in some cases the cremaster is reduced either in part or wholly to the condition of a fibrous membrane ; while in other cases, it is seen to be manifestly thickened. The prolongation of the intermuscular fasciæ, of the fascia transversalis and the fascia propria, expanded out upon the surface of the tunica vaginalis below the cremaster, are more often worn away or thickened from space to space, than infiltrated or transformed into lardaceous tissue. The elevations and prominences that are sometimes presented by the tumor, are owing to this, that the fibres of the dartos, and of the prolongation of the ring, and of the cremaster, have allowed themselves to be elongated or separated apart by the distended tunica vaginalis. These different tunics, however, preserve their pliancy and all the other characters they possess in the normal state. They are only altered mechanically, and with the exception of a few rare cases, we do not meet here with any evidence of a pathological process. It is from having failed to make a proper distinction between hematocele and hydrocele, that a great number of facts have been related in opposition to what I here advance.

c. *Testicle.*—That which is most variable in the morbid anatomy of hydrocele, is the condition of the testicle. When the disease has begun in the tunica vaginalis, the testicle is usually slightly shrunk, flattened, and wrinkled, and in some cases actually atrophied ; if on the contrary an orchitis have previously existed, there is an evident augmentation in its volume, but without any other appreciable alteration. The epididymis, now indurated and bosselated, is prolonged upwards, downwards, and upon each side, in such manner as to spread beyond the seminal gland itself. All this, however, is usually restricted to mere hypertrophy. Small hardened and whitish-colored kernels or actual cysts may exist on the surface of these organs, and present the appearance of having been developed in the tissue of the tunica albuginea. I have seen a cyst of this kind acquire the volume of a nut. In such cases the tunica vaginalis will be frequently found to have contracted adhesions in the form of bridles, and in such manner that its cavity has become divided into several compartments. I have seen many patients at La Charité, in whom the hydrocele had been constituted in this manner, of several cysts each containing one or two teaspoonsful of serosity. I operated upon a patient at La Pitié in 1834, in whom the tunica vaginalis had been transformed into an infinite number of similar compartments. Is it not one of these conditions which was noticed by Schmucker, (Rougemont, *Bibl. Chir. du Nord*, p. 36,) and which M. Larrey has described under the name of hydatid or vesicular hydrocele. The *spermatic cord* being more or less expanded and compressed, is disorganized as it were by the separation of its constituent parts. But in other respects it is usually healthy. Its vessels are almost always contracted, while on the contrary, the arteries and veins

which are distributed in the tissue of the scrotum, are very considerably dilated. There is also, however, sometimes found here a slight varicocele.

III. *Signs.*—Hydrocele is recognized by various signs; it is generally developed from below upwards, or from the bottom of the scrotum to the ring of the external oblique. At first soft, and as it were fungous, it ultimately becomes tense, and acquires a very great degree of density and solidity.

a. In the first stages the form of the tumor does not materially differ from that of an hypertrophied testicle. At a later period it becomes elongated and pyriform. Turned in the direction towards the abdomen, its apex, which is sometimes slender, at others swollen in the form of a head or cylindrical, is prolonged in some instances into the inguinal canal, or between the aponeurosis of the external oblique and the integuments, but it most usually stops a little below the ring. It almost always presents a species of transverse strangulation at the middle portion of its length, and especially in front; which gives to it the appearance of a *gourd*. When this strangulation is very marked, and formed for example by the ring, and when a portion of the tumor has become developed in the inguinal canal, Dupuytren applies to it the name of a *bisacculated* hydrocele. Bent into an angle in this manner upon its anterior surface, the tumor has greater length than breadth; sometimes, however, it is as it were crowded down upon itself, and remarkably augmented in its transverse diameter; frequently, also, it presents prominences on other points, either above or below, or upon its outer or inner side, all which circumstances are owing to the scrotal envelopes having been attenuated or distended in an unequal manner by the tunica vaginalis. It sometimes happens that it preserves the form of a sphere, either uniform or bosselated, up to the period of its extreme development; sometimes also, its base is above and its apex below, several remarkable examples of which have been seen at La Charité.

b. The *volume* of the hydrocele is no less variable than its form. Limited in certain cases to that of a small pullet's egg, it may in others acquire the dimensions even of the head of an adult. In some cases adherent, as it were, against the ring, we see it in others prolonged nearly as far down as the knee. It may contain from one teaspoonful to two, three, and even four litres of liquid; nevertheless, it rarely exceeds the size of the head of a new-born infant, and usually does not contain over from four to ten ounces of serosity.

c. Its weight is generally less than one would at first be disposed to think. Being the same as that of an equal quantity of water when the hydrocele is simple and primitive, it becomes more considerable when the testicle is engorged, or when some concrete deposition has been made in the tunica vaginalis. The lightness of the tumor also, is one of the principal signs of its freedom from complication. These differences, moreover, are quite natural, since the blood is heavier than serum, and solid tumors still heavier than blood, whether the latter be liquid or coagulated.

d. So long as the tunica vaginalis contains but a moderate quantity of liquid, an actual fluctuation may be recognized. At a later period, however, it is sometimes very difficult to detect the fluctuation or

displacement of the liquid; the exploration, moreover, should be made in the same way as in speaking of acute hydrocele.

e. The pathognomonic sign of hydrocele, and the one which practitioners have for a long time considered the most certain, is derived from the *transparency* of the tumor. To ascertain this, the patient must be placed in a dark room, or for example, upon a bed with the curtains closed, and the scrotum stretched and raised up, and the hand or any other opaque body applied in the manner of a plate of wood at its border in front of the tumor, while the surgeon should be on one side and a lighted candle held on the other, in such manner, finally, that the light cannot reach the eye until after having passed through the hydrocele. By acting in this manner we perfectly distinguish the transparent contents of the tunica vaginalis, however little water it may contain, from the opaque mass formed by the testicle or epididymis. It is possible, however, that we may be imposed upon in this case in two ways: 1st. A transparency may be perceptible though there may be no hydrocele. M. Roux states that he ascertained this in a case in which there was nothing but a saccule. This transparency may exist in some cases from a simple serous infiltration or slight dilatation of the envelopes of the scrotum in children, and pale subjects, or in whom the skin is very thin. If the hand is placed very obliquely, and the fingers are but slightly shut together, and if the light or the eye are badly arranged, this appearance of transparency may be produced by the luminous rays being reflected back upon the walls of the tumor. 2d. This sign is quite frequently wanting, first, when the effused liquid does not consist of pure serosity; secondly, fluid or concrete blood, and the chocolate or reddish colored matter, or that resembling the lees of wine, or when lactescent, &c., will not admit of it. It did not exist in the patient whom I operated upon with M. Salacroux, and in whom the tunica vaginalis was filled with a liquid of a deep green color, nor was it found in another patient operated upon at La Charité, in October, 1836, for a hydrocele in which the serosity was slightly turbid. Again, it is but rarely seen when the envelopes of the cyst have acquired a certain degree of thickness, when they have undergone a lardaceous or cartilaginous degenerescence, or plates of fibrin or albumen have been deposited on the inner surface of the tunica vaginalis. I will, however, add that its absence indicates almost always either an opaque liquid or a deep-seated alteration in the texture of the cyst, and in all cases a complicated hydrocele or a tumor, which belongs rather to the class of hematoceles than to that of hydroceles, properly so called. If blood, in fact, is effused into the tunica vaginalis, it becomes changed and ultimately forms matters resembling lees of wine, or of a chocolate or reddish color, or bridles and concretions of all sorts, together with friable or fibro-cartilaginous linings in the sac, &c.; but it may also happen that the serum will become separated from the cruor, that the coloring matter will disappear, and that at the expiration of a certain number of months or years, there will be no longer anything else in the tumor but a citron-colored fluid with the shell as thick as it is hard. In other patients the transparency which existed at first is no longer found during the space of several weeks, but afterwards reappears

again in a striking manner. This is a fact which I have ascertained in three instances, and a similar one has been communicated to me also, by M. Bérard, the elder. Sometimes also, the transparency, when it has once disappeared, returns no more.

It is easy to furnish an explanation to these anomalies; and, what is singular, the clue to this, so to speak, suggested itself on the same day to M. Bérard and myself. I had made it the subject of a lecture at La Charité in the morning, when this surgeon informed me that he had communicated the same idea to the pupils of the hospital of St. Antoine on the day preceding. The explanation is this, that a certain quantity of blood is exhaled and effused in any manner whatever, in the middle of a hydrocele which is more or less ancient. The liquid of the tunica vaginalis from being translucent then becomes opaque. If, at a later period, the coloring matter of the blood disappears, the transparency is re-established. In the contrary case the hydrocele remains definitively transformed into an hematocele. As for the rest, the eye is sufficient to ascertain the transparency of a hydrocele, if it really exists, while, in other cases, no additional information will be derived by means of the tube of M. Ségalas, or reflecting mirrors of whatever description they may be. When the transparency is wanting it must be imputed to the alteration of the sac or of the effused liquid, and not to the imperfection of the explorative means made use of. A circumstance, however, which might lead to ambiguity to a certain extent, is the position of the testicle and of the cord. We generally look for the transparency in front, upon the outside, or above, because the testicle is almost always crowded to the inside, and downwards and backwards; but if the testicle should be found by anomaly, either in front, as I have seen it in four or five instances, or immediately upon the inside or outside, we may, in fact, conceive it possible for it to be placed in such manner, between the eye and the light, as to deceive the surgeon on a rapid examination. The error in a case like this would, to a certain extent, be pardonable, especially if there were present at the same time a tumefaction or disease of the epididymis or testicle. The diseases which have sometimes been confounded with hydrocele, though of various kinds, may be referred to two classes, those originating in the seminal gland and those disconnected with it. All the modifications of sarocele belong to the first class, while the second is composed of enterocele, epiplocele, varicocele, hematocele, cysts and adipose or other tumors, which are developed either in the scrotum or in the inguinal canal. A pupil pointed out to me in the septum of the scrotum upon the dead body, an ovoid, uniform and movable tumor, which might have easily led to deception if it had been less heavy. A tumor of the same kind had already been mentioned by M. Malère, except that it contained four pounds of water and resulted in the death of the patient.

IV. a. *Prognosis.*—Chronic hydrocele, left to the resources of the organism, will continue for an indefinite length of time, and scarcely ever disappears. The cases of spontaneous cure which are related, are such rare exceptions that it would be impossible to count upon a termination of this kind. Hitherto I have met with but a single example, which was in a child seven years of age, in whom

the tumor was of the size of a pullet's egg, and had existed for fifteen months. It completely disappeared in the space of ten days; but a month later I perceived that the serosity again began to be effused into the tunica vaginalis.

*b. Accidental laceration of the cyst.*—It is nevertheless possible that the hydrocele may be dispersed, at least for the space of some weeks, without any treatment, but in such cases it is owing to the action of some violence which, by tearing the cyst, has forced the liquid to infiltrate itself elsewhere. Bertrandi relates an example of this kind; the patient, having indulged to excess in drinking, found himself pressed by an urgent desire to urinate. The case mentioned by Sabatier was attacked with a violent cough, and M. Krimer also speaks of an effort made in the case which he cites. A similar remark is applicable to the case communicated to me by M. Serre. The patient mentioned by Loder had received a kick from a horse. A similar fact was seen at La Charité in 1836. In another patient, however, in whom the hydrocele disappeared during the night preceding the day on which he was to be operated upon, there was no infiltration observed in the scrotum, nor had there been any violence; but the fact was not accompanied with sufficient details to enable me to come to any conclusion in relation to it. Such results, however, are easily explained. An effort, or some pressure or concussion, tears or lacerates the tunica vaginalis, when the serosity is effused and immediately infiltrated either into the spermatic cord or in the direction of the inguinal canal, or between the different layers of the scrotum, and even into the parietes of the abdomen, as in the patient of M. Lacordière. In such cases the cyst shrinks, and is succeeded by an œdema of the cord, scrotum, or penis, which œdema, in general, disappears quite rapidly when the patient is neither far advanced in age nor of a shattered constitution. Moreover, it rarely happens, in such cases, that the cure continues permanent. In the patient who fell under my care the infiltration continued but for the space of three days, and the hydrocele returned soon after. At the expiration of three weeks it was already perceptible.

In a patient who had ruptured it against the pummel of a saddle, the tumor at the expiration of six months had acquired its primitive volume. The same thing took place in the cases related by Bertrandi, Sabatier, Boyer and M. Nocelet, (*Gaz. Méd.*, 1838, p. 156,) and if it has not been always observed, it is because the persons who have met with these injuries have not probably been seen again a few months after the accident. Thus it is in reality the hydrocele which is reformed after having been effused by means of a rupture, and not as might be at first supposed a hydrocele which is discovered after having been temporarily masked by an accidental infiltration. When the hydrocele is of a large size, this infiltration by spreading to the penis and walls of the abdomen, in some cases gives a volume to the scrotum which becomes alarming to the patient. M. Roux was consulted in 1828, for a case of this kind, and the physician himself, though very skilful, was somewhat alarmed. The ecchymoses moreover, which are sometimes associated with it, might in certain cases give rise to the supposition of gangrene, if the practitioner was not acquainted with this accident from hydrocele. The cases, moreover, which

I have collected, prove that it is unattended with any danger. A suitable suspensory, some topical resolvents, and a few days of repose, will be sufficient to remove the œdema, which probably would even be dissipated without these means. The patient mentioned by M. Serre was so satisfied of this that he caused the dispersion of his hydrocele by rupturing it as often as it became too troublesome.

V. *Treatment.*—Hydrocele may be subjected to two modes of cure, one palliative, and the other radical.

a. *Palliative cure of Hydrocele.*—The operations to which patients affected with hydrocele were formerly subjected, were so painful and uncertain in their results, that the question might well be asked, if they were not worse than the disease itself. Thus we see, de Vigo prescribed simply that the tumor should be emptied twice a year, while Paracelsus absolutely forbade an opening to be made into it. At the present day also, it frequently happens that the surgeon is obliged to follow the process of J. de Vigo, in some cases, because the patient exaggerates the danger of the operation or is too timid to submit to any; in other cases, because it is impossible for him to suspend his occupations and to continue eight days at rest; and sometimes also because he is too advanced in age to feel the necessity of a radical cure of an infirmity of so little importance. We confine ourselves therefore, in these different cases, to emptying the tunica vaginalis so often as its distension becomes too annoying. As the effusion almost scarcely ever fails to be reproduced soon after, and as we are thus obliged to repeat the puncture every two, three, four, six, or eight months, this mode of treating hydrocele has taken the name of the *palliative cure*. The operation is performed in the same way as in the method for injections, of which in reality it constitutes the first stage. The patient may remain seated or stand up. The point of a lancet or of a bistoury could, in these cases, be substituted without any inconvenience for the hydrocele trochar. Then however, it would be advisable to glide a probe into the wound, in order to preserve its parallelism during the discharge of the liquid. The whole operation is less important than a simple bleeding, and no precaution is required either before or after. The patient operated upon may resume his occupations on the same day, with the condition only that he should wear a suitable suspensory, and not fatigue himself. In general, the cyst fills up again in the space of one to three months; sometimes, however, and I have seen many instances of this, the hydrocele does not return to the same extent, until after the expiration of more than a year. In certain cases, which are more rare, it does not return at all. In some cases too it happens, and these also are exceptions, that after the puncture the tunica vaginalis becomes inflamed to such extent as to enter into suppuration, and to transform its cavity into an actual abscess. One of the patients in this condition, who fell under my observation, caused me during eight days a considerable degree of alarm. The fever was intense, and the inflammation reached a portion of the iliac region. It became necessary to open the tumor largely at several places, and the cleansing of the abscess was not effected until after the expiration of several weeks. M. A. Cooper also mentions a case in which the simple puncture gave

rise to very serious accidents, and he recollects another in which it was followed by death on the sixth day.

*b. Radical Cure.*—The thesis of M. Lesueur contains the evidence that leeches and derivatives have in several instances succeeded in curing hydrocele. On the other hand, we see that Dupuytren has effected a cure in several instances by means of blisters applied over the tumor, and other practitioners have related various facts in support of this last practice. According to Bertrandi, moxa in some cases has been no less efficacious. M. Graefe, as Keate had also done in 1788, extols a solution of muriate of aminonia in alcohol or vinegar of squills. I have myself seen a hydrocele dispersed in two instances by astringent cataplasms and mercurial frictions; but these exceptional cures are scarcely ever met with except in cases of hydroceles that are not very ancient or those which are small in size, and which have been caused by either a traumatic lesion or an irritation the source of which we are enabled to remove. In the two patients whom I saw cured, the disease had existed only for two months and had been produced by a blenorragic engorgement of the testicle. Blistering, muriate of aminonia dissolved in water or in coarse red wine, and the most active astringents have been used without any benefit in my department on other patients, in whom the hydrocele had only existed however for the space of six weeks, and had been occasioned by an injury done to the testicles; leeches and emollients also had been previously employed with a similar unsuccessful result.

1. *The operation* selected for the radical cure of hydrocele has varied in a remarkable manner since the time of Celsus. Incision of the tumor, excision of a portion of the sac, scarifications upon its interior, its cauterization with caustics or the red hot iron, and the employment of tents, meches, canulas, setons and various kinds of injections, have in turn been eulogized in such manner as to constitute a variety of different methods, the greater part of which have been finally proscribed by modern surgery.

2. *Cauterization*, which Aetius describes after Leonidas, which some practitioners employed by placing an escharotic at the lower and others at the upper part of the tumor, repeating it until it had reached the liquid, and which some operators preferred accomplishing by means of an incandescent metal or the L shaped cautery mentioned by Paul of Egina, was in use as is seen a long time before Guy de Chauliac, to whom Sabatier appears disposed to ascribe it. Preferred by G. de Salicet, Thévenin, M. A. Severin and Dionis, and revived a thousand times since, it has been eulogized in England, France and Germany; but under whatever form it has been proposed, it is a method which should be totally proscribed.

3. *Tents and canulas*, which are less dangerous or at least less barbarous, would in my opinion deserve the same proscription, had not certain surgeons of distinguished reputation in our time still thought it advisable to accord to them a certain degree of approbation. The use of tents, far from being ascribable to Franco, F. ab Aquapendente or Moinichen, as Sabatier and Boyer would lead us to suppose, goes back as far at least as to the time of G. de Salicet, who, in speaking of hydrocele, expresses himself in these terms:

"Let the scrotum be perforated with a lancet, the water be drawn out and a tent introduced into the aperture, in order that you may freely, whenever you desire, extract what there is within the tumor." Only that in place of a process so simple, F. de Hilden has advised that we should ligate the tunica vaginalis, and then incise it and leave a thin meche in it, a process which Bell has followed with this last intention. Monro, imitated in our time by M. Guérin, (Rey, *Thèse*, No. 79, Paris, 1834, p. 89,) recommends that we should irritate the serous tunic with the extremity of the canula of a trochar, and M. Larrey, that we should leave permanently in its interior during the space of several days the extremity of a gum-elastic sound. Though it be unquestionable that we are indebted to the employment of these means for a certain number of successful results, it is equally certain that instead of producing a simple adhesion of the surfaces they very frequently cause them to suppurate, and that they do not succeed sufficiently often to supersede the methods that are generally adopted at the present day.

4. The same must be said of the *seton*, of which Sabatier finds no mention in the ancients, and which Sprengel ascribes to Lanfranc, and M. S. Cooper to Franco, though Galen probably had reference to this when he mentions that we should extract the water from the scrotum by means of a syringe or a seton. It was also on account of the recommendation of the physician of Pergamos that Guy de Chauliac advises that we should grasp "the scrotum by means of flat tenacula with holes at their extremities, in order to perforate it, by passing through their opening a long needle, in the head of which was inserted a seton which was to be left in the wound until the water was evacuated." It would seem moreover, as has been remarked by Leclerc, that C. Aurelianus had spoken of this process. Peyrilhe also considers that he has found the suggestion in Paul of Egina. Though Paré, and almost all authors, had recommended it up to the termination of the seventeenth century, this method, which is censured by Pigray, was nevertheless almost wholly abandoned until Marini and Pott undertook to bring it again into repute; but there is no reason to suppose that the seton, which is still employed by M. Green, (*The Lancet*, 1829, vol. XII., p. 388,) will be hereafter preferred by any person. However, if any person should again decide upon employing it, the name itself is a sufficient explanation, and nothing more is required than to recollect that a ribbon of fine linen or a long meche of cotton, or any other substance, is to be passed through the tumor, in order to enable any one to comprehend the mode of performing an operation of this kind.

5. *M. Van Onsenoort*, who employs the seton under the name of a *ligature*, makes use of a semicircular needle with an eye near its point. In an ordinary hydrocele, he supposes the tumor to be divided into three equal parts by two transverse lines. Introducing his needle at the upper line, he brings it out at the lower, extracts the serum, and then withdraws the needle and tightens the ligature by means of a bow-knot. In large hydroceles, the needle containing a double ligature is introduced at the middle portion of the tumor. After having brought out its point above the upper imaginary line, he separates one of the threads from it and repasses his needle into the interior of

the tumor, in order to bring it out below the lower imaginary line. The second thread being now disengaged from it, and the tumor emptied, he divides the noose which corresponds to the opening where the needle entered, in order to have two ligatures which are knotted separately. In a double hydrocele, a single ligature is passed obliquely through the septum from above downwards. These ligatures, which are slightly tightened at first, and tied with a bow-knot, in order to be afterwards tightened again at pleasure, according to the degree of inflammation, should be sufficiently strong to effect the section of the parts which they embrace.

6. *M. Kerst* having perceived that the serum flows with difficulty through the opening made by the instrument of Onsenoort, and that infiltrations and abscesses frequently take place, has proposed a trochar needle whose curvature forms the quarter segment of a circle of three inches and a half in diameter. The body of the needle is pierced near its point, and its canula has two lateral openings near the upper extremity. It is introduced in the same manner as the needle of *M. Van Onsenoort*. The thread is disengaged and the needle withdrawn. The serosity then runs freely through the canula, which is gradually brought out in proportion as the tumor becomes evacuated, and finally withdrawn through the lower opening.

7. To treat hydrocele with the seton, we ought, says *M. Laugier*, to traverse the tumor with a trochar, then withdraw the stilette of this instrument, and introduce into the canula an eyed probe furnished with a seton; then return the canula into the tumor, which now only commences to empty itself; and when it is empty, finish by withdrawing the canula and leaving in the seton, the extremities of which latter are afterwards tied with a loose knot. But it is difficult to comprehend the utility of such processes after having been witness to the successful results and the simplicity of the method generally adopted in France.

8. *Incision*.—Incision, which was made use of at the time of Celsus and Guy de Chauliac, is performed by means of a straight or convex bistoury. The patient is laid upon his back with his limbs moderately flexed, while the surgeon grasps the scrotum on its back part with his left hand, and in this manner makes the tumor tense. With his right hand he incises its upper portion, in penetrating from without inwards if he uses the convex bistoury, and by a puncture if he employs the straight bistoury. The opening at first should be sufficiently large to admit of the introduction of the finger, which latter should be replaced by a grooved sound, if through inadvertence we have made too small an incision. A blunt-pointed bistoury then answers for completing the division of the entire anterior wall of the cyst, cutting with it from above downwards, and from within outwards. As our object is to produce an adhesion of the two membranes of the tunica vaginalis, by creating a suppurative inflammation, the wound should be filled with lint and dressed daily in such manner that the cicatrization can only take place from its bottom to its borders. By this means we generally obtain a permanent cure; only that it is not an uncommon occurrence for some points of the membrane to escape from the suppuration, and consequently to give rise to the formation of small cysts, which allow of the partial repro-

duction of the disease. The pain and accidents which sometimes accompany it, and the length of the treatment, have generally caused this process to be rejected in France, at least since the time that we have come into possession of those that are more simple; so that notwithstanding the reasonings of M. Rust, M. Warren, M. Dieffenbach, M. Gama, M. Bégin, (*Elém. de Chir.*, &c., 2d edit., t. III., p. 525,) and of M. Chelius, (*Arch. Gén. de Méd.*, t. IX., p. 230,) who still appear to give it the preference over every other, this method appears destined to form no longer any other than an exceptional resource.

9. *Excision.*—Excision also appears to have been in use at the time of Leonidas. We find, in fact, in the ancient authors, that some of them, after having opened the tumor, seized, in order to extract it, the lips of the tunica vaginalis and rolled them inwards upon hooks. It is to Douglas, however, that we are indebted for having drawn the attention of the surgeons of the last century to this process, and for the reputation it still retains among us. There are many modes of performing it. The English surgeon commenced by circumscribing, by means of two incisions, an elliptical flap of integuments on the front part of the scrotum, removed this flap and opened the tunica vaginalis, which he then dissected little by little, until he reached nearly down to its adhesions with the testicle, in order to excise immediately its two sides by means of a good pair of scissors. Boyer recommends a simple incision upon the whole length of the hydrocele, then to dissect the tunica vaginalis as far as possible on the side of the seminal gland, before giving egress to the liquid, and afterwards to open the cyst and excise its flaps. Finally, Dupuytren found it more simple to embrace the whole of the tumor underneath with his left hand, in order to stretch its anterior wall as much as possible, then to incise, like Douglas or Boyer, according as it should or should not be found necessary to remove a flap of integuments, and afterwards to enucleate, so to speak, the tunica vaginalis by pushing it from behind forwards, and expelling it, in a word, nearly in the same manner as we would a kernel of fruit, by pressing it between the fingers. This being done, he opens the cyst and excises it in the manner which has already been stated. Whatever may be the process adopted, the wound is immediately filled with soft lint, and the rest of the dressing is precisely the same as after the simple incision. We see by this description that excision, which is still preferred by M. Fricke, (*L'Expérience*, t. II., p. 408,) is a painful method, and necessarily more protracted than the others. Its advantages are, that it does not allow the disease to be reproduced, since it effectually destroys the organ which is the seat of it. Nevertheless, as it is impossible to remove the totality of the tunica vaginalis, we cannot perceive how it can absolutely secure us against a return of the disease. Experience, moreover, as Boyer has remarked, has shown that hydrocele has sometimes returned after excision as well as after incision: this, therefore, is another method which is to be rejected in the treatment of simple hydrocele.

10. *Partial excision and immediate reunion.*—A remark of Pott would seem to indicate that this surgeon did not look upon the extinction of the vaginal cavity as indispensable in the cure of hydrocele. M. Ward even maintains that hydrocele is frequently cured, though the

serous cavity of the scrotum may have preserved its original dimensions; and M. Green (*The Lancet*, vol. XII., p. 388,) adduces, in support of this opinion, a specimen preserved in the museum of St. Thomas's Hospital. M. Ramsden is of the same opinion, and M. Kinder-Wood, according to M. Walsh, adopted this idea for the construction of a new method. This surgeon, after having divided to the extent of a few lines all the tissues down to the tunica vaginalis, dissects, in order to excise it, a small flap from this membrane. The liquid being evacuated, the wound is united by first intention, by means of one point of suture. Without participating in the anticipations of M. Walsh or his countryman on this subject, I cannot, however, omit remarking, that a case which occurred in my department at La Pitié in 1831, might perhaps be adduced in support of Pott's assumptions. The patient was over fifty years of age, and his hydrocele was double the size of the fist. I operated with the vinous injection, and the scrotum had almost returned to its natural condition, when an attack of apoplexy carried off this patient on the twenty-sixth day after the operation. Being desirous of ascertaining the progress of the morbid process, I carefully dissected the parts, and was surprised to find the tunica vaginalis entire, with its natural polish, and containing nothing else in its lower portion than a glutinous filamentous matter of a slightly green color, and which had not contracted any adhesion. The testicle, moreover, and its envelopes, were entirely sound. In two subjects whom I have since had an opportunity of examining, the vaginal cavity, on the contrary, had entirely disappeared. M. A. Cooper also cites a case in which the tunica vaginalis was only imperfectly obliterated; but could it be affirmed that the cure, under such circumstances, would have been complete. If a hydrocele cured by an irritating injection may return at the expiration of thirty years, as in the patient of M. Ansiaux, (*Clin. Chir.*, 2d edit., p. 215,) or after the lapse of some years or months only, numerous examples of which exist, is it not evident that the tunica vaginalis in such cases has not been obliterated?

**VI. Injections.**—Almost all modern authors, upon the strength of an assertion of A. Monro, attribute the idea of injections, in the radical cure of hydrocele, to a military surgeon of the same name as this writer. They had, however, been recommended and in use a long time before. Celsus had already remarked, that if there is water in a pouch, we must, after having emptied it, throw up injections of a solution of nitre or saltpetre. Lembert of Marseilles, whose commentaries and observations were published in 1677, formally states, that the best method to be followed in the treatment of hydrocele, consists in extracting the water by means of a canula, in order to be enabled afterwards to inflame the cyst by injecting eau phagélique into it through the same canula. His trials with this process inspired him with so much confidence that he came to a resolution to employ no other afterwards. The eulogiums which were at first lavished upon this process by Monro, and afterwards by Sharp and Earle, having been weakened by the unsuccessful results of many other practitioners, injections did not get into repute in England, and were in fact not generally adopted in France, until after the memoir of Sabatier. As it is at present the only process almost which is

followed, I propose to speak of it in a special manner, and to enter more into its details than with any of the others. There is no necessity of my refuting the assertions of those who recommend, that in place of the ordinary trochar, we should make use of one that is flattened, or that before making the puncture we should divide the skin and the subjacent tissues by means of a lancet, since the inutility of these precautions is at the present day generally conceded. Nor is there any longer any necessity of discussing the opinion of D. Schacci, who has greatly extolled an elastic canula surmounted with a cutting point, inasmuch as the hydrocele trochar, either with or without a notch on one of the sides of its canula, has been long since regarded as quite sufficient in every case. Though we no longer differ in opinion, however, on the best instrument to be employed, nor on the manner of making the puncture, and withdrawing the liquid, it is not altogether the same with the irritating agent.

a. *Various liquids.*—The ancients had recourse, as we have seen, to solutions more or less acrid. Lembert made use of *lime-water* charged with corrosive sublimate. The surgeon spoken of by Monro employed alcohol, either pure or diluted with water. At the same epoch *red wine* was also made trial of. Earle greatly eulogized *port wine*, while Juncker preferred that of *Medoc*, and Leveret confined himself to a solution of caustic potash. The solution of *sulphate of zinc*, indicated by Bertrandi and M. A. Cooper, has succeeded 100 times out of 106 cases in the hands of M. Mott. Boyer and Dupuytren finally succeeded in securing the adoption of red wine, either simple or with a small quantity of alcohol, or in which roses of Provence have been boiled. I have seen used, and have used myself spirits of camphor, to attain the same object, *Cold water*, (Béclard, Fricke, *L'Expér.*, t. II., p. 408,) *air*, (Gimbernat, *Ibid.*, p. 404—Manieri, *Journ. des Conn. Méd.-Chir.*, Mai, 1838, p. 215; 5 examples.—Riccardi, *Observat Prat.*, p. 11, 1836;) *milk*, the liquid of the hydrocele itself, a solution of *marine salt*, of *alum*, (Gerdy, *Arch. Gén. de Méd.*, December, 1837;) *nitrate of silver*, (Parent, private communication, 1838,) and *tannin*, (Chaumet, *Ibid.*, 1839,) have also been made trial of. When we reflect upon the result which is to be obtained, it is easy to comprehend that these different agents are in fact in some cases calculated to answer the views of the practitioner. The object in fact is to irritate the tunica vaginalis, and to create an adhesive inflammation in its interior. Now cold water, wines of all descriptions, brandy, caustic solutions, in a word any liquid whatever, even the extremity of a canula or tent, or the presence of any foreign body whatever it may be, are evidently of a nature to produce this result; the only thing we have to ascertain is, what succeeds best, and is attended with the least inconvenience.

b. *Red wine.*—Experience up to the year 1832 having apparently decided in favor of strong red wine, made stronger by a small quantity of alcohol, or by having roses boiled in it, I could not understand at that period why it had been thought advisable to make trial of other liquids. It must be remarked, however, that alcohol, rejected by many authors, who considered it too irritating, produces no effects more alarming than ordinary wine, and that if I did not adopt the employment of it, it was because I had seen it fail in

three cases out of eleven patients operated upon, while the wine, which I had myself made trial of in about 60 cases, did not fail but in five instances. Justified by new experiments, I shall hold at the present day another language, after having described in detail the vinous injection.

1. *Operative Process.*—Before emptying the scrotum we are to have prepared a syringe properly arranged and of the capacity of nearly a demilitre; we must also have at the same time a litre or two of liquid prepared in the way which has been described, and a chafing-dish filled with live coals to heat it. Sundry basins are also necessary, either to contain the wine for injection or to receive the water of the hydrocele. When every thing is arranged in this respect, the surgeon, after the patient is placed upon a bed provided with alezes, embraces the scrotum in the same manner he does for incision or excision, and again satisfies himself that he has an actual hydrocele before him and not another disease; also that the testicle and various portions of the spermatic cord are placed in certain relations, and not in others. With his right hand the operator then takes the trochar armed with its canula, and plunges it in with a short stroke (*d'un coup sec*) upon the anterior, lower and outer part of the tumor, as far as to the centre of the liquid. This point is to be preferred because, in the ordinary state, the testicle and its dependencies are found upon the inner side, and below, and behind, and that it is the best mode of reaching the middle of the vaginal tunic. It is unnecessary to say that if a different arrangement had been ascertained to exist before commencing the operation, the instrument should have been carried in another direction and upon the point which would appear to be the most suitable; the absence of resistance, a small drop of liquid, which sometimes escapes between the wound and the canula, the depth to which we have reached and the void in which the point of the trochar appears to be situated, sufficiently indicate that the instrument has entered into the cyst. The surgeon then embraces the canula near the skin with the two first fingers of his left hand, and imminently withdraws the stilette, in order to enable the liquid to run out. When the sac is partially emptied he presses it in every direction, taking care that the beak of the canula does not become embedded between the envelopes of the scrotum. Up to that time also, the beak of the instrument must not be allowed to reach the inner side of the morbid cavity in such manner as to interrupt the egress of the liquid. An assistant immediately fills the instrument with the injection, which should be of the temperature of about  $32^{\circ}$  Reaumur, or more, if the tissues of the patient should appear to be but slightly irritable, or when the liquid itself is not very irritating, but under contrary circumstances, the temperature should be a little less, at such temperature, in fact, that the hand may support it, but with some degree of inconvenience. The syphon of the syringe is then directed into the external opening of the canula, to which it should have been applied beforehand, in order to be sure that it is exactly adapted to it. The assistant then gently pushes upon the piston until the instrument is empty or the cyst filled with liquid; the operator constantly supporting the canula near its root, prevents it from butting against the inner

side of the sac, or from being withdrawn so much as to become entangled in the tissues of the scrotum, while at the same time, with his forefinger he shuts it and prevents the escape of the liquid at the moment when the assistant has removed the syringe. An additional quantity of the injection is now immediately thrown up in the same manner, or more if necessary, in order to give to the tumor as much volume nearly as it had before the operation. It is to be retained each time within the tunica vaginalis for the space of three minutes according to some practitioners, four or five according to others, and as some recommend even six or seven. Finally, there are others who advise that the tunica vaginalis should be filled a third time before emptying it definitively. Moreover it is advisable, it is said, if not indispensable, to expel from the cavity even the last remaining drops of the liquid, and also the air which may have got introduced into it, before we remove the guiding canula.

2. *Dressing, and natural consequences of the Operation.*—For dressing, it is the practice to surround the scrotum with compresses saturated with wine similar to that of the injection, and to renew these compresses three or four times in the space of every 24 hours until the fifth or sixth day, that is to say, until the inflammation has acquired the degree of intensity desired, and until we may replace them by emollient cataplasms. In some patients the inflammation acquires its greatest degree of intensity on the day after the operation; in such cases the tumor is hot, red, and painful, and has acquired a size almost equal to that of its original dimensions. In other patients this does not happen until about the fourth, fifth, or sixth day. In a patient whom I operated upon in November, 1831, there was, so to speak, no pain or swelling during the first two weeks. The inflammatory symptoms in another did not come on until the 10th or 12th day, although he was yet young and very excitable, and of a nervous rather than a lymphatic constitution. He had been operated upon also the preceding year, and without having been any more incommoded by it. In both patients the success was complete. A *febrile movement*, sometimes even quite an acute degree of fever, together with all the symptoms of a manifest general reaction, accompany this local inflammation. M. Blandin speaks of a case in which the inflammation extended to the veins of the cord, and caused the death of the patient; but it rarely happens that serious accidents result from it. The system sometimes even appears to be unconscious of what is passing in the scrotum. The matter which is effused in the cavity of the tunica vaginalis has this remarkable feature, that it is soft, clammy, semi-fluid, and constitutes, in every sense of the word, plastic lymph. There is, however, also associated with it, in a considerable number of cases, a certain proportion of serosity, but scarcely ever any albuminous flocculi, or actual pus. This effusion continues while the inflammation is increasing. Its resorption is afterwards effected by degrees in such manner that the parts may reacquire their natural volume at the expiration of twenty days, a month, or six weeks, and this process seems also sometimes to extend to the envelopes of the scrotum, which were more or less thickened, as well as to the testicle, whose tumefaction is in some respects a necessary consequence of the original disease,

or of the operation. While the more fluid parts of the effused matter disappear, its concretable portion is imperceptibly blended with the two walls of the tunica vaginalis, which latter become so perfectly agglutinated together; that there cannot be found ultimately any vestige of cavity between the testicle and the surrounding tissues. When the inflammation begins to diminish, that is to say about the 8th or 10th day, emollient cataplasms are generally no longer indicated, and resolvent compresses embued with wine, or vegeto-mineral water, should be substituted in their place. As resolution in some cases goes on too tardily, it is advisable to assist it by suitable means. Cataplasms of flax-seed flour, wet with extract of lead, have in many cases appeared to me to be advantageous; the applications however which possess the most efficacy, are mercurial ointment either alone or under the form of a cataplasm, also iodureted or hydriodated pomades, either simple or combined with opium, and employed in small quantities in the form of frictions on the tumor. An important precaution during the whole course of the treatment is to give perfect support to the scrotum by means of a good suspensory. Though the inflammation may rarely proceed to the extent of causing abscesses, this nevertheless is an accident which is sometimes seen: then the scrotum will be seen to become red, projecting, and afterwards fluctuating on a determinate point of its surface, presenting all the symptoms of a phlegmon or actual abscess. The indication is the same as that for acute abscesses in general. Thus leeches, if we suppose we can prevent the suppuration, and cataplasms, and the opening of the collection as soon as its existence is clearly ascertained, constitute the principal treatment. In other cases, the tumor, after having diminished a third, half, or three-fourths of its original volume, continues to remain in the same state, leaving the cure incomplete. It is in such cases that topical astringents and resolvents are especially advantageous. They have been seen to triumph over this obstinacy in the disease, and to complete the cure at the moment when it was supposed another operation would become necessary. If finally, nothing should succeed, we have still the resource of repeating the operation.

3. *Precautions to be taken.*—The method by injections, such as I have described it, does not, in the majority of cases, require any other precautions; but if the tumor should be of *large size*, equal, for example, to the head of an adult or still larger, it would be well to follow the counsel of Bertrandi and Schmucker, (*Rougemont, Bib. Chir. du Nord*, p. 37.) who recommend that before injecting the irritating liquid into the tunica vaginalis, we should make one or more precautionary punctures, in order to enable the scrotum to return upon itself, and not to be compelled to excite inflammation upon so large an extent of surface. I have, however, operated without this precaution on a man forty-eight years of age, and in whom the hydrocele, which was very ancient, was twenty-four inches in circumference. No accident supervened, and the cure took place in the usual period of time. During the time the liquid is being thrown up, the patient usually experiences a *pain*, which is transmitted through the track of the cord, and is considered as an evidence that the irritation has reached the degree which is desirable, and some are even satisfied to find that this pain extends to the side and lumbar region, so that in

general quite an unfavorable result is predicted when this last is not felt. As all persons are not endowed with the same degree of sensibility, and that the tunica vaginalis may be altered to a greater or less extent, all patients will not experience this pain to the same degree. In persons who are *aged*, or where the hydrocele is *ancient*, and we apprehend a marked *thickening* in the *cyst*, it is advisable to heat the wine to a very considerable degree, or to render it somewhat more irritating than for those patients who are found under opposite conditions. Moreover, it is not to be supposed that the operation will not succeed because the pain in question has not been developed; experience has a hundred times demonstrated the contrary.

4. *Accidents.—Gangrene of the Scrotum.*—The canula, as I have already said, readily abandons the vaginal cavity while the scrotum is retracting and emptying itself. This accident, which apparently is very trivial, may lead to the most serious consequences. The assistant, under such circumstances, almost unavoidably injects the liquid between the tunics of the scrotum without being conscious of it; there results from this an inflammation which almost invariably terminates in gangrene, if in fact it does not at the very first jeopardize the life of the patient. Boyer was witness to a case of this description. The surgeon had charged an assistant to hold the canula while he himself threw up the injection: a gangrenous inflammation supervened, and the patient died. A similar fact is related by M. A. Cooper, and another occurred in 1836, in one of the hospitals of Paris. I saw an accident of this kind in 1824; the integuments and the subjacent tissues became gangrenous throughout almost the entire extent of the scrotum; the symptoms, nevertheless, ultimately subsided, and the patient was restored. M. A. Cooper states that he has frequently noticed similar gangrenous inflammations produced by the infiltration of the wine into the tissues of the scrotum. This accident is then indicated, even at the very moment of the operation, by the pain which the assistant causes in endeavoring to make the liquid penetrate, by the resistance which he meets with, and by the projections which he recognizes in the neighborhood of the canula, and which latter, moreover, he perceives does not have its extremity acting freely in the tunica vaginalis. Upon the supposition that the effusion has taken place, it would become necessary immediately to scarify to a great depth the whole thickness of the scrotum at a great number of points, and to go even somewhat beyond the limits of the infiltration. The antiphlogistic treatment and emollient cataplasms would be first had recourse to, after which we should make use of topical resolvents if, in spite of the means mentioned, gangrene should become developed or extend. Gangrene of the scrotum may also manifest itself, even though the injection may have actually been thrown into the vaginal pouch. This is a fact which is not mentioned by authors, but which, however, does not appear to be very unfrequent. Many persons have stated to me that they had noticed it, and some intelligent pupils have informed me that they had witnessed it in three hospitals of Paris in the course of the same year. I have myself collected many remarkable instances of it. A man, sixty years of age, who had a double hydrocele of moderate size,

was operated upon by me at the hospital of St. Antoine, in the spring of 1829. The puncture and injection were made only on the right side, and the liquid was thrown up twice into the morbid cavity without any impediment or difficulty. The proof that it had effectually entered into this cavity is, that we made the whole of it come out through the canula after the last injection, with full as much facility as it did after the first. The patient, moreover, experienced only the usual pain. On the first, second and third day, the swelling of the scrotum followed its customary course; the inflammation continued even quite moderate; but on the fourth day we perceived a point mortified on the lower side of the tumor, and though I immediately proceeded to scarify the parts, the gangrene nevertheless proceeded so rapidly that it involved the scrotum down to the root of the penis, and gave rise to the general results which usually accompany it; we ultimately, however, triumphed over it. The sphacelated sloughs were successively detached, and the globular vaginal tunic, almost naked at the bottom of the wound, appeared to be filled with a softish matter, as if nothing peculiar had taken place; and after a long course of treatment the cure was accomplished, even on the side which had not been operated upon.

In the second case treated at La Pitié in the month of November, 1831, nothing could have induced us to suspect the occurrence of such an accident, when, on the fourth day, without there having been any pain, or redness, or any perceptible signs of inflammation, I discovered a large eschar on the front part of the scrotum. No reaction took place, the tissues gradually exfoliated, and the cicatrization was ultimately accomplished. I have been witness to three similar facts since. In one, everything went on as in the preceding patient; in the two others the part involved comprised only an inch in dimension of the sub-cutaneous tissues of the scrotum.

In the three patients there was this remarkable feature, that the mortification was not preceded by any apparent inflammation before the ninth day, and that it was announced by a simple tumefaction, accompanied with crepitation on that part of the scrotum upon which it was to occur. Where can we discover the cause of this gangrene? It is certainly impossible to attribute it to the effusion, by means of the canula, of a certain quantity of wine between the tissues which separate the tunica vaginalis from the skin, and yet, nevertheless, there is scarcely any other thing to which we can impute it, except the vinous infiltration. I can perceive, moreover, four ways in which the fact may be susceptible of general explanation. In distending the tunica vaginalis by the injection to a great degree, we may readily cause a laceration in it, and the exudation externally to it of some few drops of the irritating liquid. It would not be surprising to me if this had been the result in the second case I have described. In him, however, as in the first, as the accidents did not manifest themselves until the fourth day, an explanation of this kind can scarcely be admitted. We ought to refer it perhaps, in these two cases at least, to the existing debility, absence of reaction and state of alarm which accompanied them, and to the gradual transmission of the inflammation from the interior to the exterior. If gangrene of the scrotum can be produced by a simple puncture, or

even without any previous puncture, we cannot see what should prevent its taking place *sometimes* in the vicinity of a hydrocele, which has been operated upon with the vinous injection. Lacerations of the tunica vaginalis being easily made through its fibrous lining, surgeons should be careful not to distend the parts during the injection more than they were by the hydrocele itself. This precaution is so much the more important, inasmuch as the wine regurgitating between the canula, whether it is notched (*crénelée*) or not, and the tissues, might possibly become in this manner infiltrated into the substance of the scrotum. M. A. Bérard, who adopts this explanation, (*Gaz. Méd.*, 1833, p. 404,) invokes in its favor a fact which he considers conclusive. Thus is it a reason, therefore, for dispensing with the groove which is seen on the outer side of certain hydrocele canulas. Too large a canula, leaving an opening so wide that the tunica vaginalis may afterwards insinuate some drops of liquid into its track, is also calculated to favor the infiltration in question; this is another argument for making use of a small one. I would add, that if a certain quantity of wine should be left in the cyst after the withdrawal of the canula, it is readily perceived that this liquid might become infiltrated through the puncture and give rise to the same accidents; so that we ought to empty the tunica vaginalis as perfectly as possible before withdrawing the instrument, and afterwards abstain from making any kind of pressure whatever upon the scrotum.

5. Two other *accidents*, viz., *hemorrhage* and *puncture of the testicle*, may also accompany the operation for hydrocele. The first, which J. L. Petit was the first to point out, and upon which Scarpa has dwelt so earnestly, can arise only from three causes: 1st, from the wounding of the arterial branches supplied to the scrotum, by the external and internal pudic arteries or by the epigastric; 2d, from a puncture of the vessels of the testicle; and 3d, from a simple sanguineous exudation upon the inner surface of the tunica vaginalis. From whatever cause it may arise, we can scarcely comprehend any immediate danger from it. None of these vessels are sufficiently large, at least in their natural state, to make their division in reality alarming. As to the means to be employed, they resolve themselves into that of making a free opening into the sanguineous collection, should its resolution be too tardy in being accomplished, or should there be apprehension of any serious symptoms. Moreover, it would no longer be a hydrocele which would have to be treated, but in reality an *hematocele*, as in the case related by M. MacIlwain.

6. *Puncture of the testicle* can only take place in those cases in which it has been impossible to identify with precision the situation either of the spermatic cord or of the seminal gland itself. There is danger of it also when the hydrocele is but slightly developed. Dupuytren, Boyer, and almost all surgeons of somewhat extensive practice, have had an opportunity of noticing it. The pain which it produces, and which is very acute in certain cases, possesses a peculiar character which prevents the possibility of any ambiguity. The organ sometimes becomes violently inflamed, and may be destroyed by suppuration; nevertheless, this wound is attended with fewer dangers than would be at first supposed. A patient wounded in this

manner, and in whose testicle the extremity of the canula had only entered so far that the injection itself could detach it, scarcely experienced any other symptoms than those which ordinarily accompany the operation by injection. In another, however, there supervened an abscess which I laid open, and which, during several weeks, gave me much apprehension that the seminal organ would be destroyed. In two other cases I have seen the effects of this puncture entirely disappear on the following day.

7. *Emphysema*.—A final complication of injection is the retention of a certain quantity of air or gas in the tunica vaginalis. I have seen several examples of this; among others, two in which the crepitation continued during the space of nearly fifteen days. In these two cases, however, as in the others, no serious results took place, and the cure was effectually established. In other cases resolution was not effected, and I consider it proper that we should be on our guard against this complication, which, in my opinion, throws a doubt on the efficacy of air injections.

VIII. *New methods*.—I have been a long time persuaded, from the inconveniences and dangers of vinous injection, that we would be authorized or even compelled to have recourse to other or new resources.

a. *Acupuncture* was the first remedy that presented itself to my mind; a young physician had informed me, moreover, in 1831, of a case in which the patient was cured in eight days by the simple puncture of a long needle which had accidentally been introduced into the scrotum, though his hydrocele had existed for a period of three years. M. Moro has published a case no less remarkable: it is that of a hydrocele which was cured in six days by perforating the scrotum with a needle, which was left in the parts in the manner of a seton. It would appear also that in India this is a common method with those who do not employ puncture at first, followed by a meche. In consequence of these facts I made trial of this process. Two patients were submitted to it at the hospital of La Charité in July, 1836, but neither of them were cured. In two other cases I introduced a simple thread, crosswise, through the tumor, instead of leaving in the needle; I withdrew the small setons on the third day; suppuration supervened, and the cure was effected, but more tardily and with greater inconveniences than with the vinous injection. I consider, therefore, that acupuncture, whether with or without the threads, is a process which should be wholly proscribed in the treatment of hydrocele. Having in four other patients made trial of puncture with needles until a small drop of serum made its appearance, as recommended by M. Lewis, I found the hydrocele diminish and even disappear from day to day, *without infiltration*; but the effusion nevertheless was reproduced, and a permanent cure not effected in any of the patients. This method, made trial of successfully by MM. Hacket (*Lancet*, February, 1837, p. 787,) and King, (*British Annals of Med.*, No. I., p. 13,) did not succeed in the hands of M. Davidson (*Gaz. Med.*, 1838, p. 72,) and M. Davey, (*Lancet*, February, 1837, p. 741,) and certainly was not of sufficient importance to be claimed in honor of M. Travers, (*London Med. Gaz.*, Feb., 1837,) or M. Cumin, (*Ibid.*, March, 1837, p. 866,) as it has been.

b. *Compression*.—I asked myself the question in 1832, whether a methodical compression, executed by means of a retractive plaster, might not sometimes succeed in curing this affection in those persons who were not willing to submit, or who could not be subjected to any of those operations which are generally considered capable of effecting a radical cure. In consequence of this suggestion, strips of adhesive plaster, which, when properly applied, so promptly cure an acute orchitis, were made trial of by me on three patients in the course of the months of September and October, 1836. Though the scrotum comprising the testicle on the diseased side were immediately enveloped with these plasters after the puncture, in such manner as to place and to keep in contact the two walls of the tunica vaginalis, this did not prevent the liquid from being reproduced. This method therefore should also be proscribed. Every thing induces me to believe that such will not be the fate of the following process.

c. *Iodine Injections*.—Having understood that preparations of iodine had been made use of as *topical applications* in hydrocele, and that cures had been ascribed to them, imputed to their resolvent virtue in glandular engorgements, it also occurred to me that I would use them in the form of injection. For that purpose I made use of a solution or mixture of water and the alcoholic tincture of iodine. After having emptied the cyst by the ordinary puncture, I injected into it the liquid in question. It is unnecessary to fill the vaginal tunic with it, provided by kneading (malaxant) the tumor we force the liquid to come in contact with the whole of its interior. We immediately withdraw the whole of it, but without any danger, should a small quantity of it be left behind. As it is not necessary to heat the injection, nor to fill the cyst with it, nor to extract every portion of it, the syringe usually employed for injections of the urethra might be made to answer; and if the hydrocele should be voluminous, it would be sufficient to fill it three or four times. After the injection the patient is not obliged to keep his bed. The part continues to swell during three or four days, but without causing fever or any severe pain; resolution then commences and is generally promptly completed. I have used this method in more than one hundred cases. None of the patients have experienced the slightest accident; most of them were cured in less than twenty days. In four the resolution was only half completed upon the thirty-first day; I repeated the operation, and the cure then was promptly effected. Seven had already been unsuccessfully operated upon by the vinous injection or cauterization; six had an encysted hydrocele of the cord; in three the tumor contained about twelve ounces of serosity; in twenty-five the testicle was hypertrophied, bosselated, and dis eased for a long time; in all except one the malady had existed over six months; and one had been effected with it for fifteen, and another for twenty-four years. In using the tincture of iodine as a substitution for wine, there is no necessity for a chafing-dish or particular kind of syringe, nor of any preparatory means. As we are not obliged to distend the tunica vaginalis, we run no risk of causing a reflux of the liquid, or of forcing it into the tissues of the scrotum. As it is an absorbable substance, its infiltration does not seem to ex-

pose as much to the danger of gangrenous inflammation as wine does; and there is no necessity of its being retained in place longer than from five to ten minutes. I designedly left an ounce of it in the cyst, and the cure was only so much the more rapid. The reaction of the pain in the lumbar region is nothing. Patients usually suffer but very little, and may get up and walk on the following day without any serious inconvenience. A young man who had been subjected to the vinous injection without any benefit, came from the city to be operated upon that morning at the hospital, from whence he returned home, and afterwards continued to go out daily. Another patient whom I operated upon in presence of MM. Parent and Nicolas, took his daily walks without the cure being thereby interfered with. The cure is more prompt, and full as complete, as with the wine. One of the patients whom I treated in this manner in 1835, and who was cured by the tenth day, afterwards died in consequence of an amputation of the leg. The scrotum, which was carefully dissected, showed that intimate cellular adhesions had been established between all the points of the vaginal cavity, and that any return of the disease would have been impossible. With this liquid a syringe of the capacity of from three to four ounces is sufficiently large for all cases; only that it would be necessary, if we should make choice of one specially for this purpose, that we should select a substance which should be the least susceptible of alteration by the iodine, or of reacting upon this liquid. Up to the present time I have made use of syringes of pewter.

This subject was in this condition in 1836 and 1837, when I published my first observations on iodine injections. Made trial of since by M. A. Bérard, Laugier, Marjolin and Michon at Paris, it has procured the same results. Moreover, a memoir published by M. Du-jat, (*France Méd.*, p. 2, 1836—*Arch. Gén. de Méd.*, Janvier, 1837,) shows that a surgeon of Calcutta, M. Martin, has treated several thousand cases of hydrocele in this manner, and that out of 1000 cases for example, there was only one return of the disease! The efficacy of this remedy, therefore, is at the present day established beyond all doubt. I ought to add, however, that at Hamburg, M. Fricke has not met with any success from it; but besides the fact that in the same town, M. Opeinheim has been no less fortunate than ourselves, the failures of M. Fricke are susceptible of a ready explanation. M. Fricke, instead of the cold liquid, made use of that which was heated to 30° of Reaumur; and in place of one-third of the tincture, he employed in three of his patients, only one twenty-fourth part. This is not honestly experimenting with a therapeutical process, to make trial of it with such wide deviations! For myself I have up to the present time, (June, 1839,) made trial of it under every variety of form. With the tincture in its pure state or diluted one-half or a third or fourth part, injected tepid or cold, with a part only or the whole of it left in the cyst, and using it either in recent hydroceles or such as were ancient or small, or of vast dimensions, or simple, complicated, vaginal, hernial, acquired or congenital; in liquid hydrohematoceles, it succeeds to admiration; but the best plan is to mix it to the amount of one-half with water at the natural temperature and to leave a portion of it in the diseased sac. Though I have decided

upon giving the preference to this formula, I nevertheless sometimes use the tincture itself alone. By becoming mixed with the serosity, a portion of which also I leave in the sac, it produces precisely the same effect as if it had been diluted at first with the same quantity of water. We have even the advantage in this way, of preventing the escape of the iodine externally. The alcoholic tincture of the pharmacopeia, is the only one which I have made use of up to the present time. In conclusion, it is demonstrated to my satisfaction at the present day, that in the treatment of different varieties of hydrocele, the alcoholic tincture of iodine in injection, produces precisely the same results as the vinous.

C. *Complicated Hydrocele*.—We have already seen in treating of the pathological anatomy of hydrocele, what might be the possible complications connected with it. If the disease exists at the same time in both the vaginal tunics, the rule is to perform the operation upon one side only at first; otherwise the inflammation might be followed with too intense a reaction. I cannot perceive, however, how there could be the slightest danger from this source, if we made use of the tincture of iodine, except in the event that the hydrocele was of very large size. Though it may be true that in certain cases both tumors have been cured by operating on one only, this however is a rare occurrence, and it is also true that in operating on both sides upon the same day, the patient is restored in one half the time that he is in performing the operations successively.

I. When the hydrocele is composed of a *turbid fluid*, or one that is sanguinolent, or simply lactescent, and that the walls of the cyst have not lost their pliancy, it is recognized by all the different signs above enumerated, except that of its transparency. Provided the liquid is not overcharged with flocculi, and that there are no concretions in the cyst, the iodine injection will effect a cure in the same way as in simple cases.

II. If, on the contrary, there should exist *fibrinous* or albuminous masses, whether free or adherent; if the matter, in place of being serous, is of the consistence of cream or of diluted chocolate; and if the cyst is constituted of a thick hard *shell*, whether the contained matter be or be not altered, it may be affirmed that the method by irritating injections will in most cases be found insufficient. In such cases, *excision* is the process generally preferred. I have myself made trial of it, and I have succeeded, but it is a painful and serious operation. In some cases it is followed by a considerable degree of inflammation and fever. The suppuration does not dry up, and the wound will not cicatrize until after the expiration of one to two months. Since the year 1834, I have substituted instead of it simple incisions and a seton. With a straight bistoury, I make by means of a puncture an incision an inch long, upon the point of the tumor where the trochar is to be inserted. The liquid escapes, while the finger pressed upon the cyst, detaches and expels from it the concrete pelotons. If the cavity has but little extent I stop at this point, and encourage suppuration by keeping the wound open by means of a tent. In the contrary case, I incise in the same manner the depending point of the sac, and insert through the two wounds a thin meche of linen, after the manner of a seton. By pro-

ceeding in this manner, we produce a tumefaction and reaction, which reach their highest point of intensity from the fourth to the eighth day, and which afterwards decrease and allow of the foreign body being withdrawn, from the fifth to the tenth day. The patients whom I have treated in this manner have recovered in the space of from twenty to thirty days. In one of them the seton was not employed, but I traversed the cyst with five large incisions in place of two. It is well to recollect moreover, that in this complication the testicle and its envelopes, after the cure, remain manifestly larger than upon the opposite side, whatever may be the mode of cure which has been pursued. Excision, therefore, does not appear to me to be indispensable, except in those rare cases in which the liquid is surrounded with a stony, osteo-calcareous or simply cretaceous shell, one instance of which has been seen by myself, another by M. Mott, and three by M. A. Cooper. Upon the supposition that we should decide upon this process in other cases, it would be more advisable, I think, to excise a fourth or fifth of the lardaceous shell, rather than remove nearly the whole of it, as is recommended by Boyer. I have operated in this manner on two patients, and with decided advantage.

III. The same remarks are applicable to a hydrocele rendered double on the same side by a complete partition in the tunica vaginalis, as to a *double* hydrocele, properly so called. That is to say, that we may operate upon both of them at the same time, or upon the second, after having cured the first. Their proximity perhaps would render the inflammation of the second somewhat more probable after operating upon the first. I consider, however, that unless there are particular objections to the contrary, it would be better to proceed immediately to the injection of both cysts. In a man 51 years of age I injected at first only one of the hydroceles. The swelling and other local symptoms of inflammation were very strongly marked, but it nevertheless became necessary to operate, three weeks subsequently, upon the second sac.

IV. When the accompanying *tumefaction* of the *testicle*, or of the *epididymis*, is unattended with pain, and inconsiderable in extent, all practitioners agree that we should pay no attention to it, and look only to the hydrocele; but, if the tumor constituted of these parts, says Boyer, should be lancinating and bosselated, the injection would accelerate the degenerescence. Experience has shown me that this assertion is erroneous. I have made use of vinous and iodine injections in many cases of hydrocele complicated with hypertrophy, tubercles of the testicle and scirrhous or encephaloid sartocele already far advanced, and yet the tunica vaginalis has been obliterated without the primary disease having been aggravated by the process; moreover this injection, in reality, is one of the best resolvents that can be employed in chronic engorgements of the testicle. I have thus used it in patients who had the epididymis as large as an egg, slightly flattened, bosselated and painful, and thus affected for the space of several years, but who were rapidly cured by it without other treatment. I have even come to the conclusion that in cases of testicular engorgements complicated with hydrocele, and where doubts exist upon the propriety of proceeding at once to castration,

it would be advisable to have recourse, before doing anything else, to injections with tincture of iodine.

V. *The multiplicity of cysts* in the tunica vaginalis, a disease denominated *hydatid hydrocele* by M. Larrey, is incompatible with the process of injections. The tumor, in such cases, represents a coarse sponge, (*éponge à large mailles*,) which cannot be emptied completely by a simple puncture, nor inflamed in every part of it to a sufficient extent, and the septa of which might be liable to mortification, especially from wine. This is what took place in 1833, at La Pitié, in an English laborer, in whom it became afterwards necessary to remove the testicle. In such cases the operation by incision is evidently preferable to all others. The scrotum and all its cells are to be largely laid open by means of a convex bistoury. Small balls or a pliant roll of lint being inserted between the lips and down to the bottom of the wound, compel the whole to suppurate, after which the cavity is to be cleansed and cicatrized in the same way as any abscess laid open by a large incision.

VI. The complication of a varicocele would change in no respect the treatment of a hydrocele, any more than would the presence of a tumor or any lesion whatever, in the track of the inguinal canal.

VII. It is not altogether the same, however, with a *hydrocele* complicated with scrotal *hernia*; should it be an *enterocele*, it may in fact happen, under such circumstances, that the intestine has protruded into the tunica vaginalis, and that it shows itself there naked through some rent or actual perforation and may encounter a species of strangulation. Cases of this description have been noticed in the practice of Dupuytren, at the Hotel Dieu, and in that of M. Bérard, the elder, at the hospital of St. Antoine. Setting aside the embarrassment which such an arrangement must create in regard to the diagnosis, whether in relation to the hernia, or the strangulation, or the hydrocele, the surgeon should not forget that by means of the puncture he may wound the hernia before arriving into the tunica vaginalis, should the intestine occupy the anterior plane of the tumor; or that he may do so after having traversed the vaginal sac, should the intestine be behind; and that if through an ancient or recent opening a vinous injection should come to penetrate into the hernial sac, the most serious accidents *might* be thereby produced. Before all else, therefore, the hernia must be returned. If after that, the pressure does not cause the disappearance of the hydrocele, we can proceed without danger to the irritating injection, inasmuch as we then have the proof that the tunica vaginalis does not communicate with the peritoneal cavity. For greater security, however, it will be advisable to compress the ring and to proceed in the same way as will be mentioned under the article *Congenital Hydrocele*.

VIII. *Chronic affections of the integuments of the scrotum*, such as eczema, syphilitic indurations and pustules, constitute no objection to the operation for hydrocele, in the same way as in uncomplicated cases. I would make the same remark of an incipient elephantiasis, if the effusion into the tunica vaginalis was in such cases worthy of the slightest attention. Should there exist a simple erysipelas, we ought to wait until this has been cured. Phlegmonous erysipelas, on the contrary, as well as inflammation of the interior of the serous

cyst, would require that we should proceed at once to multiplied and deep incisions.

D. *Congenital Hydrocele*.—By this name is to be understood the hydrocele of a tunica vaginalis, in which the cavity has not yet become separated from that of the peritoneum. We perceive by this that it can rarely be met with except in children. Its formation is explained by the primary relations of the testicle with the abdomen on this subject, in truth, there exists a degree of anatomical ignorance which ought to be corrected. The species of cord, in fact, which extends from the inguinal canal nearly as far as to the kidney, where the testicle is first found, and which, since the time of Hunter, has been known under the name of *gubernaculum testis*, is not constituted, as is supposed, of an infundibuliform prolongation of the subcutaneous fascia. I have seen in specimens prepared by Thomson, that it was formed by the cremaster, and that this muscle taking on the form of a noose with its convexity upwards, and in a direction the reverse of that which it subsequently assumes, is perfectly adapted for depressing the testicle down to the ring. I will remark that according to the same specimens, we are compelled to admit, contrary to the opinion of Scarpa, that the inguinal canal is, to say the least, as oblique before as after birth and in the adult; that the two rings of this canal, so far from being situated exactly one behind the other, are also separated by quite a long track. However this may be, the testicle does not pass through the parietes of the abdomen without being accompanied by a prolongation of the peritoneum. Now it is in this appendage or in the infundibulum which is produced by it, that congenital hydrocele takes place. If in depressing the peritoneum the liquid should form a tumor which becomes lodged in front of or behind the cremaster muscle, the hydrocele alone might exist in the scrotum below the testicle, which has been still retained or which remains concealed in the inguinal canal. In some cases the arrangement is entirely the reverse; the testicle descends first and the aqueous tumor is seen above it; but in most cases the hydrocele and testicle present the same relations as in ordinary hydrocele. This malady, which Vignerie was the first to investigate with attention, and which is sometimes seen in new-born infants and in the first months of life, is also afterwards found up to the age of eight or ten years, but rarely at a later period. Though we might admit that the serosity could directly reach this cavity from the abdomen, I am nevertheless of opinion that it is in most cases exhaled by the tunica vaginalis itself. The frictions of the scrotum during the progress of parturition, the irritations which are caused by its coming frequently in contact with the urine, and all those different kinds of pressure to which it is exposed during the first periods of intra-uterine life, furnish, as it appears to me, a better explanation than the supposition of a diseased condition in the abdominal peritoneum. Moreover it appears to me to be imputable to the same causes as hydrocele in the adult, unless it be however that it rarely arises from an affection of the testicle. It is distinguishable from every other kind, by our being enabled to empty the tumor by pressure, and to cause its liquid to return into the belly. The age of the patient is of itself sufficient to lead us to suspect its character. As it diminishes when

the patient lies down and augments when he is standing up, there is scarcely ever as great a degree of tension of the scrotum as in ordinary hydrocele. The communication of the cyst with the peritoneal cavity, moreover, is so contracted in most cases, whatever may be the position of the testicle, that pressure does not cause the disappearance of the serosity, but makes the tumor return rather in mass through the external ring. The prognosis of congenital hydrocele is at the same time less serious and more so than hydrocele in adults; less so, because the disease disappears more readily without an operation; more so, because the operation, should it become necessary, would seem to be more dangerous. Its two principal inconveniences are that of interfering with the development of the testicle or in retarding its descent, and also of exposing the child to the risk of hernia of the tunica vaginalis. It gets well frequently without any remedies, and by the progress of age alone.

Compression by means of a pelote methodically sustained upon the ring, together with topical resolvents, will be found sufficient to cure the patient in a great number of cases. I have seen two cases of this kind cured in children of from 5 to 7 years of age by the employment of simple compresses saturated with lead water. Unless therefore from some particular indications to the contrary, we must not be in too great a hurry to operate. The same methods, moreover, are applied to this as to hydrocele in general. Incision, excision, the tent, the seton, and acupuncture, would be still more dangerous than injection, by reason of the suppuration which they give rise to, and the effusion which might ensue into the peritoneal cavity. Congenital hydrocele, moreover, being scarcely ever complicated with hematocele or any considerable degree of thickening in the scrotal tunics, presents no indication for the employment of these different methods. As to irritating injections, these have been proposed by Viguerie; but almost every surgeon of the present day is decidedly opposed to them. The reason they advance is this, that during the operation it is almost impossible, notwithstanding the most accurate compression made upon the ring, completely to prevent the wine from penetrating into the peritoneal cavity, and that in such cases we should be in danger of substituting a fatal inflammation, or peritonitis, in place of an affection of a mild character. I cannot however, in any manner, concur with Desault in his fears on this point. A young boy operated upon by Mignot, with the vinous injection, at the hospital of Tours while I was a pupil there, was cured without having undergone the slightest accident. I have performed two similar operations, and have been no less fortunate. In the first place, it is easy to avoid the introduction of any liquid into the abdomen at the moment of injection; for this purpose it is sufficient to press the thumb into the ring with a certain degree of force upon the pubis, while the assistant is throwing up the injection. The surgeon might even do it himself with one hand, while holding the canula with the other, should there be no assistant to whom this duty could be assigned during the injection. A few drops of wine, moreover, in the cavity of the peritoneum would expose to but very trifling danger; a certain quantity is requisite to produce a serious inflammation. M. Cloquet speaks of a patient who had in this manner received several ounces

into the abdomen, but who nevertheless survived. The swelling which succeeds the injection, would not allow of the few drops which might be remaining in the tunica vaginalis to ascend into the belly. As to the inflammation of the cyst, it is of an adhesive character which has but very little tendency to extend beyond the surfaces which have been in contact with the wine. Finally, tincture of iodine, rendering it unnecessary to distend the sac, being readily absorbed, and causing only a moderate degree of inflammation, and but very little reaction, presents moreover, if I do not deceive myself, all the security required under such circumstances. I am of opinion, therefore, that congenital should be treated with tincture of iodine in the same way as ordinary hydrocele, with the precaution only of closing the inguinal canal with the thumb, during the injection, and without the necessity of afterwards keeping up this compression by means of a pelote, or any bandage whatever, as some persons have recommended.

E. *Hernial Sac.*—Hydrocele of the hernial sac differs in more than one respect from hydrocele of the tunica vaginalis, and presents itself also under various forms. In some cases in fact, there is at the same time both a hydrocele and a hernia in the same sac, and in other cases a hydrocele only in a sac which has been deserted by the viscera.

I. The first case, though generally passed over in silence, is quite frequent. The contained intestine is then found to be at the root of the tumor, and plugs up more or less completely either the crural or the inguinal ring; the liquid surrounds it, and becomes accumulated below it. It is difficult for a hydrocele of this character to exist without some symptoms of strangulation, should the hernia be formed by the intestine, and difficult therefore to confound it with a hydrocele, properly so called. Should there be, on the contrary, any of the epiploon, it is easy to conceive that the tumor might be so arranged as to simulate in almost every point a hydrocele. A kind mass, of a certain degree of solidity filling up the canal and prolonging itself towards the iliac fossa, and constituting the root of the tumor, together with the fixed position of this last, the presence of the testicle below under the form of a small suparadded tumor, and also the signs of epiplocele, should any of these be present, would enable us to distinguish it in a large number of cases; but it is evident that we would be liable to be deceived in some others. Supposing, however, that the disease should have been recognized, and that the hernia should not have caused in itself any accident, what ought we to do? I do not hesitate to say that it would be advisable to apply to it, as I have in three instances done with success, the treatment for congenital hydrocele. Should the hernia occasion ever so slight a disturbance, it would be better, I think, to lay open the sac and to proceed as in strangulated hernia.

II. The second variety is better known than the preceding. Le Dran had already spoken of it, and the case which he relates possesses also this remarkable feature, that there was at the same time an encysted hydrocele of the cord, together with hydrocele in the tunica vaginalis, and an hydrocele in a hernial sac. Its formation, moreover, is easily explained: a reduced hernia leaves an empty sac,

which may be filled with serum on the following day, or closed up above at the expiration of a few years, if a hernial bandage has been properly maintained. This sac being only a simple serous cyst then, scarcely differs any longer from the tunica vaginalis. Several pouches may in this manner be successively established from the reproduction of a hernia at different intervals of time, more or less distant. In a patient operated upon by M. Belmas and myself, in 1831, there was one of these cysts of the diameter of a small egg, together with a small sac of much less extent, and at the same time a large sized hernia. This variety of hydrocele, while presenting, or being capable of assuming a certain resemblance to varicocele, might be still more easily confounded with hydrocele of the cord, or should the cyst be large, with a hydrocele of the tunica vaginalis. The pre-existence of a hernia, however, together with the development of the tumor from above downwards, and the isolation of the testicle and its position below the sac, constitute so many characters which might lead to a correct opinion. I do not consider that there would be the least danger in operating for it, in the same way as for simple hydrocele, provided we took care to close the ring during the injection into the cyst. Facts of this description, collected in my department, have been published in several journals, (*Presse Méd.*, 1837—*Bull. de Therap.*, 1838, 1839—*Gaz. des Hopit.*, 1839, p. 106.) Should the possibility of a communication with the peritoneal cavity, or the multiplication of sacs inspire some apprehensions, incision would be the best remedy; the cyst should afterwards be filled with small balls of soft lint, in order to excite suppuration in it, and to cicatrize it after the manner of an abscess.

F. *Hydrocele of the Cord.*—The spermatic cord being constituted of a certain number of lamellæ, united together by loose cellular tissue, presents one of the most favorable anatomical arrangements possible for the formation of cysts and different descriptions of infiltration: consequently there have been long noticed in this part the two varieties of hydrocele, viz., that by infiltration and that from effusion, or what is called encysted hydrocele.

I. *Infiltration*, whether sanguineous, purulent, or serous, and œdema, whether idiopathic or symptomatic, may well be the source of a hydrocele from *infiltration of the cord*, but do not constitute this form of disease. This disease, which is essentially local and chronic, is made up of a more or less considerable number of small cysts or cells filled with serosity, occupying sometimes the entire length of the cord from the epididymis to the iliac fossa, and sometimes a part only of this organ, either in the direction of the scrotum or that of the inguinal canal. Its causes are but little known, and the examples of it are quite rare. The tumor presents itself under the form of a bosselated soft cord, without any pain or cakiness, (*empâtement*), or change in the color of the skin, of the diameter of an inch, or a little more, or somewhat less, and which is arrested by a sort of strangulation at the root of the testicle or above it, or occasionally prolonged to a considerable distance into the inguinal canal. This tumor, constituting a portion of the body of the cord, being incapable of being either depressed or raised up without the testicle, and

possessing a very great degree of mobility, and existing independently of the scrotum, properly so called, will occasion, when pressed upon in a certain manner, a pain analogous to that which is produced by pressure on the testicle. Hydrocele, by infiltration, occasions still less annoyance to the patient than hydrocele of the tunica vaginalis. As it rarely acquires a large volume, those who are affected with it are frequently unconscious of its existence during the space of several years. When, however, it exceeds the dimensions of an inch, and occupies the inguinal canal, the solid walls which it is obliged to distend, ultimately render its presence annoying and sometimes quite painful. It may, moreover, whatever be its position and size, react on the vas deferens and fatigue the testicle. Finally, its indefinite increase, or any other circumstance, may cause it to inflame and transform it in reality into a serious disease. Provided it occasions ever so little disturbance therefore, or has attained a considerable volume, it is advisable to relieve the patient of his difficulty. Though it may be true that hydrocele of the cord by infiltration may disappear without an operation, this result at least must be a rare occurrence, for I know no examples of it. I will add, that the palliative cure is not applicable to this disease. Either we must do nothing or undertake an operation calculated to effect a radical cure. In these cases, caustics, excision, the seton, a tent, and even injection itself, should be proscribed as dangerous or of no utility. By traversing the whole tumor in the direction of its length with a simple thread, as I have done in one instance, we should not succeed until after having transformed it into an abscess, which it would almost always be found necessary to open largely at a subsequent period; incision, in fact, is almost the only remedy for this disease. In the inguinal canal, this operation would be very dangerous, and we should not decide upon it unless the hydrocele should have actually caused serious accidents. Between the ring and the testicle, also, it is not without its inconveniences, since it incurs the risk of wounding the vas deferens, as well as the spermatic veins and arteries. It is important also, in order to ensure success, that the infiltrated cylinder should be laid open throughout its whole extent. Whatever be the method chosen, it is an operation more serious than that for vaginal hydrocele, and one which it would be advisable not to perform unless we are, so to speak, forced to this step by the annoyance which the malady produces. The patient is to be laid upon his back, as in the operation for hernia. The surgeon with his left hand grasps and gives tension and prominence to the tumor in front, while with a straight or convex bistoury in his right hand, he divides, layer by layer, all its envelopes. Down to the cremaster muscle there is nothing to fear, but before going farther, he should satisfy himself as to the actual position of the epididymis, because it indicates in what direction he is to look for the vas deferens. This last is usually behind, accompanied with the spermatic artery, and on the other wall of the hydrocele we meet with the veins. Nevertheless, it would be better to penetrate at that point than near the artery, unless it were found impracticable to go between those two descriptions of organs. After having laid open and emptied, by making pressure, all the infiltrated cells, and after having checked the hemorrhage, if any has

taken place, the whole wound is to be filled up with a pledget or small balls of lint; the perforated linen, plumasseaux, some compresses, and a suspensory, are applied over these, and the dressings are afterwards conducted in the same manner, as has been said in speaking of the method by incision in general. As soon as the suppuration is established over the entire surface of the cavity, some advantage will be derived by favoring the approximation of the lips of the wound by means of adhesive plasters. The cure will be thus obtained in fifteen days or a month, rarely sooner, but sometimes later.

II. *Encysted Hydrocele*.—Encysted hydrocele of the cord, though sometimes a primary disease, quite frequently also succeeds to the foregoing variety, which latter constitutes, so to speak, only its first stage. It may be easily conceived, in fact, that in the course of time one or more of the cells of the infiltrated cord may become enlarged and more distended than the others, and thereby soon constitute actual cysts that will engage all our attention. Encysted hydrocele of the cord, moreover, is sometimes simple and sometimes multiple. Its form is usually globular or ovoid, and its volume varies from that of a small nut to that of the fist; but in general it is of the size of that of a large nut or a pullet's egg. Both during its development, and in its condition as a tumor, it presents the same characters as vaginal hydrocele, but its differential diagnosis is attended with some particular difficulties: it is not either with varicocele, hernia, saccocoele, or hematocele, that it can be confounded, but it may be with a supernumerary testicle. Scarpa gives an account of a mistake of this kind, and in 1836 I saw at La Charité one of the most remarkable facts under this point of view. In a man about 30 years of age, the volume, form, density, and mobility of the cyst, were so precisely similar to what is seen in the testicle, that after having purposely changed the position of the two masses in presence of assistants, I was enabled to deceive several very experienced surgeons. In this case the abnormal sac had existed from infancy, and the patient considered that he had three testicles. In examining it more closely, however, it was soon perceived that there was no epididymis under the cyst, and that the cord which occupied its place behind was prolonged as far down as to the lower tumor. Compression also served to distinguish the two tumors, since it caused scarcely any pain in one, while in the other it produced the sensation so characteristic from pressure on the testicle. In associating with these particular signs, the transparency of the cyst and the opacity of the seminal gland, we had and others will have, in such cases as I have proved in two instances, in 1837 and 1838, sufficient indications to remove all doubts, should the other characters of the tumor have left any uncertainty in the mind of the surgeon. It is nevertheless true that the diagnosis of encysted hydrocele of the cord is sometimes sufficiently difficult. Whether it be monocular or multilocular in fact, how, when the tumor or tumors are found in the neighborhood of the inguinal canal, can we distinguish this disease from cysts formed by ancient hernial sacs? If, as I consider, this disease is quite frequently established in a remaining free portion of the ancient peritoneal canal, and if in growing large it inclines in the direction towards the testicle, who is there that would not be

liable to confound it with a hydrocele of the tunica vaginalis? How moreover can we be certain that the pouch or small pouches are not caused by abnormal or morbid adhesions of the natural serous envelope of the testicle, as in one of the cases which I have above related? Fortunate will it be if these embarrassments in the diagnosis have no bearing either upon the prognosis or treatment of the disease, for it may be absolutely impossible to unravel them. Encysted hydrocele of the cord is scarcely ever seen under an acute form; it usually progresses, on the contrary, with an extreme degree of tardiness. As it rarely exceeds the size of a large egg, it scarcely produces any reaction upon the testicle, while it occasions but very little annoyance to the patient. I have also met with numbers of patients who have never expressed the least desire to make trial of any remedy for their relief. All that I have said upon the subject of the treatment of hydrocele of the tunica vaginalis, is applicable also to this disease. Modern surgeons, who have asserted that the tumor was situated too deep, surrounded with some of the elements which make up the cord, in too near neighborhood to the peritoneum, &c., have overlooked the fact that these circumstances would render the incision or excision which they recommend much more dangerous still than injections, which they proscribe. Apart from the testicle the relations are in reality the same here as in vaginal hydrocele; and should the cyst have ever so little volume, it would still be the method of injections which would be best adapted to it. I have operated upon ten patients in this manner, and have never procured results more complete or more simple.. I would therefore recommend that we should never proceed in any other manner, and that we should not employ incision, or the seton, which is still preferred by M. Brodie, (*Arch. Gén. de Med.*, t. XIV., p. 77,) nor excision, unless there should be several cysts, or that the tumor by being prolonged into the inguinal canal, should lead to the suspicion that there was a communication with the cavity of the peritoneum.

## § II.—*Hydrocele in Women.*

Scarcely any attention has been paid to hydrocele in women until during the last half century. A passage in Aetius leads to the supposition that Aspasia had noticed it. Paré mentions a young girl, six to seven years of age, who was affected with it; Desault and Lallemand also have each met with an example; but it is in Italy especially, in these latter times, that it has been the subject of special researches. Paletta first, M. Sacchi afterwards, and more recently still M. Regnoli, have gone more minutely into the details of this matter than any person had ever done before them. The researches of these observers would go to confirm the opinion, which was already ancient, of those who consider that in women hydrocele has its seat in a peritoneal prolongation known under the name of the ligament of Nuck, and which, making its exit through the inguinal canal, becomes the counterpart to the tunica vaginalis. M. Regnoli considers also that there may be both a diffused and an encysted hydrocele of the round ligament; he likewise speaks of a hydrocele in an ancient hernial sac, and facts are brought forward in support of these

opinions. An attentive examination of the principal subdivisions of this question has long since convinced me that it stood in need of farther investigations. I have various reasons for believing, for example, that several, if not all the tumors described up to the present time under the name of hydrocele in women, consisted of nothing more than serous, sero-sanguineous or sero-mucous cysts of the labia majora or mons veneris. In the first place, the round ligament of the uterus does not, as I had supposed with all anatomists, lose itself ultimately in the apex of the vulva. I have proved, as Thomson has, that this cord terminates on the pubis and in the posterior wall of the inguinal canal. It follows from this, that the peritoneum is not prolonged outside of the belly in the form of a cul de sac as in man, and thus we cannot understand how a hydrocele, similar to that of the tunica vaginalis, can take place in woman. Seeking afterwards in the facts published the proof of the results they have deduced from them, I have found none of them conclusive on this point. The cyst was between the ring and the labium majus in the cases of Paré, Desault and Lallement, and in two of those of Paletta. The labium majus itself was the seat of the cyst in many other cases. The communication with the peritoneum was scarcely established satisfactorily except in a single instance, and even in that it is possible that this communication may have been made by the surgeon himself at the moment of the operation. As to the examples of hydrocele of the round ligament, whether diffused or encysted, there is no reason why we should not consider them as facts, with this proviso, however, that it would be erroneous to compare them with those which have been encountered in the spermatic cord in man. I will add in the third place, that having seen four women affected with the disease in question, I ascertained in them, at least to my satisfaction, that the cases were those of accidental cysts, and not effusions into a primary peritoneal sac. These women, who were all of a certain age except one, who was only twenty, had severally had these tumors for the space of one, three, eight and eleven years. The cyst was of the size of an egg, or somewhat less. In one it was seen in the mons veneris in front of the ring, but in the others it occupied the upper half of the labium majus. Two of these hydroceles were filled with a thin and glairy matter like that of the white of an egg; in the two others it consisted of a serosity of a slightly rose colored tint. The sac, which was smooth like a mucous or synovial bursa in its interior, had walls of the thickness of three to six lines, though quite pliant. These tumors certainly had no relation nor any continuous connection, at least with the peritoneum or the round ligament. Might not such cysts be the consequence of former effusions of blood produced by frictions or contusions? What I have seen so often underneath the skin and in serous cavities in general, would authorize me to make this suggestion, but would not be sufficient, I confess, to establish its truth.

However this may be, cysts known under the name of hydrocele in women, are movable tumors, without pain and globular, elastic and fluctuating, with walls which are generally quite thick, and in which it is rarely possible to discover any transparency, having their seat sometimes in the middle portion, sometimes at the upper part of

the labium majus, in other cases in front of the ring, or even in the inguinal canal. The development, progress and consequences of such tumors are the same as those of encysted hydrocele of the cord in man. Their position, however, in the midst of a cellulo-adipose tissue, which is sometimes considerably abundant, and the friction which is made upon them during coition or parturition, render both their diagnosis more difficult and their prognosis more serious. It may, in fact, be conceived that in the course of time a tumor of this kind might become inflamed and transformed into an abscess, or acquire a considerable degree of size and weight. The treatment, however, is the same as in that of encysted hydrocele of the cord: caustics, the seton, tent, acupuncture, incision, excision and the different kinds of injections, therefore, could be applied to the disease. Whatever may be the method employed, there is this thing to be remarked, that the operation for hydrocele in women is scarcely accompanied with any danger: there are no testicles or spermatic cord to be respected; no infiltration to be apprehended during the injection; in fact, scarcely any of those results which might create alarm in operating upon man. The important point, therefore, is to choose the best of these different processes: and in this respect there can be no doubt that injection, incision and excision are much preferable to the other methods. If the cyst is thin, supple and filled with serosity only, and if it is at the same time of considerable size, the treatment by injections is better than any other. When the tumor does not exceed the size of a small egg, and its walls are not too much indurated, incision is preferable. Excision would have more advantages, on the contrary, if the case in question was one of hydrocele with lardaceous walls filled with thick or flocculent matter, or in part liquid and in part concrete. In whatever way we proceed, I lay it down as a rule, to direct the instrument upon the cutaneous wall of the tumor, even though it might be possible to attack it upon its mucous or vaginal side: this is a rule which I follow for all collections in the vulva, whether they be sanguineous, purulent, serous or otherwise, and one which I have adopted because the vulval and vaginal humidities are a real impediment to the cleansing and speedy cicatrization of suppurating cavities in this region. The cyst, moreover, should be laid open throughout its entire length or a large portion of it excised, for there is no necessity in these cases of preserving its parietes. I would add, that if the tumor should be very movable under the skin, we might advantageously substitute extirpation to excision or incision, and that unless some very particular objection should exist, cysts developed in the interior of the inguinal canal should be treated by incision only. The possibility of pushing the irritating liquid into the abdomen, and of wounding the peritoneum or some important vessels, as the epigastric artery for example, would not justify the employment of injection or excision in such cases, except under peculiar circumstances, and would be almost always a sufficient reason for restraining the hand of the surgeon.

[*Iodine Injections in Hydrocele, &c.*—In an animated discussion which took place in the Royal Academy of Medicine of Paris, September 9, 1845, and which continued during several subsequent sittings, (see *Arch. Gén. de Méd.*, January, 1846, 4e sér., t. X.. pp. 103.

104, and *Ibid.*, February, 1846, p. 226-234,) on the occasion of a report of our author, M. Velpeau, upon a memoir of Dr. J. Roux on *iodine injections*, employed successfully by the latter in a case of *scapulo-humeral hydarthrosis*, we perceive that the professor of La Charité still strenuously adheres to this practice, which has now, chiefly through his exertions and the successful results he has obtained from it, become generalized among the surgeons of most countries. M. Velpeau insists, especially, on the superior advantages of iodine injections in hydropsies of shut cavities, and also in hydarthroses and hydroceles. In the debate which succeeded to M. Velpeau's report, Professor Roux stated that he considered *vinous* injections had been unjustly censured: that he had employed them in no less than *fifteen hundred* cases, of which number *four* only had terminated fatally. Wine he thinks *full as good* as iodine, and besides it is far cheaper, and also accessible to every one. In hydarthroses he prefers the ordinary treatment, and thinks puncture should not be resorted to but as an extreme measure, as it is by no means without danger. M. Blandin coincided with Professor Roux, and was surprised that M. Velpeau had not mentioned in his treatment of effusions into the joints, the importance of *strong mercurial unc- tions*, together with immobility, and compression by means of the starch bandage, (*appareil inamovible*.) He does not reject puncture, but dreads the admission of air into the articular cavity. In hydrocele he considers iodine more feeble and less certain than vinous injections, and, in support of this, gives cases where the wine succeeded in effecting a perfect cure after the iodine, administered according to M. Velpeau's directions, had wholly failed. M. Gerdy concurred in the main with Professor Roux and M. Blandin, and seemed to doubt the alleged successes of iodine in hydrocele. His argument, however, against iodine because it acts as a poison, in experiments on dogs, is at best but one of a feeble collateral value. He is to be applauded, however, as we think, for his adhesion to the more rational doctrines now prevailing in favor of *conservative surgery*, so far as relates to a rash resort to puncture of close and articular cavities, the peritoneum, &c. M. Jobert zealously supported the principles laid down by M. Velpeau, founded upon the latter's brilliant and repeated cures by iodine, and which cases M. Velpeau again reproduced in opposition to the assertions of MM. Roux, Blandin and Gerdy. M. Jobert does not deny that the disease may sometimes return after iodine injections, but much less frequently, he asserts, than after the vinous. Out of seventy cases of hydrocele treated by iodine the disease returned in *three* only. Again, iodine even when infiltrated into the tissues of the scrotum, does not, in general, occasion gangrene; and, even when it does, it is limited and trivial in importance compared with that caused by wine. And lastly, he asserts that *poisoning* need not be apprehended, as he has injected *two hundred to two hundred and fifty grammes of pure tincture of iodine* into cold abscesses without any accident occurring.

M. Auguste Bérard, adopting the same views, stated that in 250 to 300 cases of hydrocele treated by him with iodine, there were three only in which the disease returned. In two cases of hydropsy of the knee-joint, it produced no effect, and amputation had to be resort-

ed to. In no case did he find any poisoning. M. Laugier also concurred in these opinions, and considered iodine injections full as efficacious, and also less painful than those of wine, and much more simple in their manual. He suggested however, that the efficacy of iodine injections might probably be solely ascribed to the alcohol of the tincture.

In conclusion, M. Velpeau eloquently defended his positions. The dangers of vinous injections, and the well known resolvent properties of iodine, and the usual enlargement of the testicle, which accompanies hydrocele, were his chief motives for the new practice. Encouraged by his remarkable successes, he tested the iodine in cases of *liquid hematocele*, *cysts* of the spermatic cord, neck, limbs, and ovarium, and in cold *abscesses*, *mucous bursæ*, and *hydarthrosies*. He found the inflammation thereby produced, in such close cavities, was not only limited, and rarely diffuse, but that it possessed also the efficacy of entirely destroying the disease by obliteration of the cavity, or a specific modification of its walls. He pointed out with minute directions the manual of the process, and the necessity of modifying it according to the disease, and the greater or less irritability of the patient, supporting all his statements on remarkable examples of cures of unquestionable authenticity. He then proceeded to a thorough examination of the pretensions of vinous injections, and demonstrated with his ready erudition and his felicitous tact, in applying it to the elucidation of truth, that vinous injections, however lauded to-day, were deemed highly dangerous by a crowd of authors anterior to this epoch, as he showed by his citations from a great number of them, and among others, Boyer. He also established, that a majority of modern authors are clearly in favor of iodine, and took the liberty of explaining the failures mentioned, by ascribing these reverses to the surgeons themselves, and not to the iodine, and that in the cases of MM. Chassaignac and Reihet, the injections were complicated with *incisions*, and therefore that they were not fair data to reason upon.

The editor of the *Archives* regrets that an exact comparative statistical table of the relative results of the two processes was not produced. He must, however, be sensible of the impossibility of procuring such details with accuracy, from those whose minds are already biased by preconceived predilections for either one or the other mode of treatment.

In respect to the employment of iodine injections for the purpose of obliterating *hernial sacs*, it is to be remarked that the subject appears to have been touched upon in the debate, but disconnected as far as we can perceive with any facts as yet obtained in Europe, on this new practice. We have alluded to it in our first volume, and also above in this, and believe the *idea* is, in its application at least, altogether due to our own countrymen. Since our first volume was issued from the press, nothing has come to our knowledge to show that any further advances have been made in this mode of curing hernia.

M. Guibourt, at the sitting of the Royal Academy of Medicine of Paris, Jan. 13, 1846, (*Journ. des Conn. Méd-Chir.*, Fevrier 1, 1846, p. 72,) remarked that the tincture of iodine produces different effects according as it is fresh or old. The fresh or recent tincture is more

irritating, from the iodine not being completely dissolved, but remaining partially free, in a state of suspension in the alcoholic vehicle, on which account it is deposited in a natural state (*en nature*) on the tissues, and acts upon them with all the intensity that pure iodine is known to do. When the tincture, on the contrary, is old, the iodine is not precipitated, in consequence of the new combinations brought about by the prolonged action of the air; it changes, however, more or less, but its effect becomes less and less irritating. M. Velpeau had, up to Jan. 1, 1846, (see *Journ. des Conn. Méd.-Chir.*, Paris, Janvier 1, 1846, pp. 10—12,) used iodine injections with entire success in twelve to fifteen cases of *hydarthrosis of the knee-joint*, only one of which was followed by ankylosis. To avoid this, a certain degree of movement is exercised upon the joint immediately after the injection, and these movements are to be continued until the functions of the knee are re-established.

By the *Compte Rendu* of the surgical clinique of Prof. Bouisson of Montpellier, for January, 1846, we are gratified in perceiving (see M. H. Rodrigue in *Journ. des Conn. Méd.-Chir.* de Paris, Mars 1, 1846, No. III., p. 116,) that the favorite iodine injections of our author, M. Velpeau, in hydrocele, are in great esteem at that celebrated southern university of France. They are adopted by MM. Serre and Lallemand in lieu of the vinous, because they rarely find them followed by a return of the disease, and are also less painful, and never produce poisoning, (*accidents toxiques*.) After the vinous injections, *gangrene*, according to M. Rodrigue, (*Ibid.*, loc. cit.) is a *very common* occurrence; but as yet we have only one well authenticated accident of this kind from iodine, viz. that related by M. Cairon, 1844. At the hospital of St. Eloi, Montpellier, the solution employed is composed of equal parts of iodine and water. It appears that as long since as March 20, 1841, an injection of tincture of iodine (32 grammes to 4 of iodure of potash and 150 of water,) was used with success, *after tapping, in a case of ascites*, by M. Dieulafoy, (see *Journ. des Conn. Méd.-Chir.* de Paris, Mars 1, 1846, p. 125, &c.) of Toulouse. M. Dieulafoy, according to M. Velpeau, (*Journ. cit.*, Fevrier 1, 1846, p. 70,) has a second time used iodine injections into the peritoneal cavity with success in another case of ascites.

*Spermatozoa*, or *spermatic animalcules*, have been noticed in the liquid of *hydroceles*, by M. Velpeau, (*Arch. Gén. de Méd.* de Paris, 4<sup>e</sup> sér., t. III., pp. 402, 403,) and soon afterwards also by Mr. E. A. Lloyd, (*Medico-Chirurgical Review*, Oct., 1843.) [T.]

## ARTICLE II.—HEMATOCELE.

*Hematocele* is a disease almost the entire history of which has yet to be written. A great number of observations ranged under cases of hydrocele belong to this. Thus, in all those cases where it is said that the matter contained in the cyst was of a red, brown or ruddy color, and of a consistence resembling honey, boiled meat, chocolate or lees of wine, we may be certain that the case in question was one of hematocele. The same remark is applicable to those cases in which the liquid, though in reality fluid and simply of a yellowish color, has been found in small quantity and contained in a thick and

as it were fibro-cartilaginous vaginal shell, formed of friable plates superimposed upon each other.

The case of the Counsellor of Payerne, mentioned by F. de Hilden, and whose death was caused by an operation performed by a charlatan, two cases also of Saviard, (p. 123, 125,) that mentioned by Scarpa, and the two facts upon which M. Raybard justifies himself in establishing a new operative process, and also the three cases of Dupuytren, all come under this description. By the fact alone, therefore, that a tumor of the scrotum, having the same form, volume, regularity, and insensibility, as a hydrocele, is found to have a much greater degree of weight, an absolute want of all transparency, and a consistence of a fibrous character, we are authorized to affirm, if the tumor is disconnected with the testicle, that it is an hematocele, either in a simple or perverted state. All doubts will be removed as soon as it shall have been ascertained by a careful exploration, that the testicle is more or less flattened, and firmly seated upon some one point of the periphery of the cyst. Only that it is not to be forgotten that in these cases, as in hydrocele, this organ, which is usually situated behind and on the inner side, is sometimes placed in front, and upon the outside or below. If we add to this, that hydrocele may be transformed into hematocele, or hematocele into hydrocele, we shall be in possession, as I consider, of all the light required to avoid any mistake in cases of this description. The treatment of hematocele, considered under this point of view, does not appear to me to have been hitherto properly understood. The disease having been sometimes confounded with hydrocele, and in other cases with the tumors of the testicle, has always been attacked either by one of the operations above described or by extirpation. The facts which I have noticed enable me, at the present day, to assert that the diagnosis and treatment of hematocele, whether recent or ancient, may be established and carried out with as much facility as those of hydrocele or sarocele.

### § I.

*In the beginning*, all effusion of blood infiltrated into the tissues of the scrotal tunics, may, by means of topical resolvents, be resorbed and disappear without the necessity of an operation. A deposition in the tunica vaginalis ought also to be subjected to the same treatment, and the operation ought not to be resorted to in these cases, unless after the lapse of a month or six weeks there should be no evidence of any tendency to resolution.

### § II.

The operation, which would be advisable under such circumstances, is the same as for an *ancient hematocele*. We may then choose between several processes.

A. The excision of the entire thickened shell was the method employed by Boyer and his school, after the rules which I have laid down above. Dupuytren, who also made use of this method, removed only the free portion of the tunica vaginalis, without making

it a point of necessity, like Boyer, to dissect this shell as far down as to its connections with the testicle. These two modes of operation, which I have myself occasionally employed, are painful, laborious, and dangerous. It is frequently difficult to respect all the portions of the spermatic cord, and the vas deferens has in more than one instance been included in the excisions. The enormous wound which it is found necessary to establish, and the abundant suppuration which necessarily ensues, expose to the risk of consequences infinitely more dangerous than those of *castration*.

B. Some surgeons also have considered, that it would be more advisable to recur at once to this *last operation*, than to subject the patient to a dissection, the only benefit from which would be to preserve a testicle, which in fact is too profoundly altered not to have lost its principal functions. Instances of castration performed under such circumstances, are still met with quite frequently in our days. M. Piussan, (*Thèse*, No. 215, Paris, 1825,) mentions one from the practice of M. Roux. I am also induced to believe that the alledged encephaloid sarocele, mentioned by M. Sornay, (*Ibid.*, No. 86, Paris, 1837,) and which was extirpated at the Val de Grâce, was no other than an hematocele. I have myself adopted this method in two instances in 1832 and 1833, even though I had ascertained with certainty that the tumor was disconnected with anything of a cancerous character. In a case of large sized and ancient hematocele, M. Voisin, (*Gaz. Méd.*, 1839, p. 81,) having emptied the sac by an injection, considered it proper afterwards to remove the testicle. At the present time, however, it is requisite that this practice should undergo a reformation on this point. Hematocele requires neither excision of the tunica vaginalis, nor extirpation of the testicle. I have treated and cured a great number of patients with this disease by either one of the two following operations, and which are the only ones I have employed since the year 1834, whatever may have been the degree of thickening or induration of the tunica vaginalis.

C. *Injection*.—I begin with a puncture by means of the trochar. If the effused matter is sufficiently liquid to escape freely through the canula, I empty the sac of it as perfectly as possible, in the same manner as in the hydrocele. Even though there should remain some flocculi or fibrinous clots, I throw up an injection of diluted tincture of iodine precisely in the same way as if it was a case of hydrocele. A patient whom I treated in this manner with M. Rivaillé, and in whom the tunica vaginalis contained about a tumbler of fluid blood of the consistence of wine lees, experienced neither pain nor any evident fever; resolution commenced on the sixth day, and the cure was so complete before the end of the month, that the operation and its consequences in the aggregate were all exactly similar to what takes place in the most simple form of hydrocele. I will remark that an analogous case was noticed by M. Gérard, who communicated the details of it to the Royal Academy of Medicine in 1837. The important point in these cases is to lay open and to empty the sanguinolent collection by means of a trochar, and not by the bistoury. If the injection should be made through an incision, it is probable that the cyst would enter into suppuration, and that the ope-

ration, besides being less effectual, would be attended with consequences much more serious.

D. *Incision.*—When the tunica vaginalis is filled chiefly with fibrinous clots, or concrete matter, and it is impossible in fact to empty it by the canula of the trochar, it is no longer allowable to have recourse to irritating injections. In such cases, the remedy should be that of the *multiple incisions*. The patient is placed in the same way as in the operation for hernia. The surgeon being on the right side, grasps and raises up the diseased side of the scrotum, and stretches the integuments while embracing the whole mass below, with his left hand. A straight bistoury inserted in place of the canula of the trochar, or along this canula if it has a groove, serves to lay open the scrotum to the extent of an inch, in the same way as in opening an abscess, from within outwards. The forefinger being introduced into the sac through this opening, detaches the concretions from it, and enables us to empty it completely. The finger afterwards serves as a guide for making at the depending or thinnest point on the hematic cavity, an incision similar to the first, and which should be effected from the interior to the exterior, or vice versa. Having abundantly washed out the entire vaginal cavity by a copious injection of water, nothing more remains to terminate the operation, than to pass through the two incisions a flexible probe threaded with a long meche of linen, embued with cerate, and the two extremities of which are to be tied into a knot, and left there as a seton during the space of four or five days. The whole is then dressed with emollient cataplasms, and supported by a suitable suspensory. After having moved about the seton in the usual manner, until a proper degree of inflammation has been established in the sac, that is to say, morning and evening, for about the space of a week, it is then withdrawn from the tumor. It is then advantageous to dress it with emollient cataplasms, so long as the inflammatory period lasts, and until the suppuration has assumed a healthy appearance, or has considerably diminished in quantity.

E. *In conclusion*, the operation for hematocele should in every respect be the same as that for abscesses of considerable dimensions with attenuation of the skin, or that for chronic purulent cysts. If any points upon the cyst should be found to have become attenuated during the course of the treatment, or if any of the matters had become stagnant in certain *culs de sac*, it would be advisable to make additional incisions. I have treated 14 or 15 patients by this process, and all of them were cured; and the greater portion in the space of from three to six weeks. In one only, the last wound did not close up until at the end of two months. There was another, however, who died; but in him the hematocele, which occupied the parenchyma of the testicle itself, was situated in an encephaloid mass, and not in the tunica vaginalis, properly so called.

F. *Liquid Hematocele* also may be cured by iodine injections, in the same manner as hydrocele; hematocele with grumous clots of blood and concretions of degenerated fibrin, may be cured by the operations generally made use of in cold idiopathic abscesses.

[*Scrotal Hematocele.*—M. L. Gosselin furnishes a remarkable case

of hematocele (*Arch. Gén. de Méd.*, 4e sér., t. V., Mai, 1844, pp. 93, 96,) of that description of hematic tumors noticed by our author, as occurring from effusion of blood into the tissues of the scrotum, and external to the tunica vaginalis; only that in this case the tumor was perfectly circumscribed, of the dimensions of a turkey's egg, and of a pyriform shape, with the base downwards, soft and evidently fluctuating, and with thin walls, not preceded or accompanied by ecchymosis. A remarkable sign, noticed by M. Gosselin, and also by M. Blandin, who operated, was a peculiar *trembling* or *tremulous* sensation felt in the tumor when it was held up in the hand. This mystery was well explained by the narrator, who very rationally ascribes it to the isolated, soft clots of blood found floating in the sanguineous liquid. The gelly-like character of these clots would naturally impart the sensation mentioned, through the thin cutaneous walls of the tumor. It is well to recollect this as a diagnostic mark, though not noticed in hematocele of the vaginal cavity itself, from the thickness probably of its serous tunic. The testicles were sound and distinct, and entirely separate from the tumor. See a note of Dr. Mott, infra. T.]

### ARTICLE III.—ELEPHANTIASIS OF THE GENITAL ORGANS.

The scrotum, penis and vulva are sometimes attacked with a degenerescence, which can scarcely be cured by any other means than by extirpation, and which authors designate under the name of the Barbadoes disease, *andrum*, elephantiasis, or lardaceous sarcoma. M. Larrey, who states that he has frequently seen this disease in Egypt, calls it oscheo-chalasis. Though very common in India and many countries of Africa, it remained among us for a long time unknown. A proof of this is to be found in the history of the poor Malabou, related by Dionis, (*Operat. &c.*, t. I., p. 373,) on the authority of Father Mazaret. Those who would be desirous of possessing more accurate notions on this subject, may consult with advantage the memoir of M. Roux, that of Delpech, (*Clin. du Midi*, t. II., p. 5 to 68,) the treatise of Boyer, the clinique of the Baron Larrey, and more especially the essay by M. Caffort, (*Tum. des Parties Génit., &c.*, 1834.) Though surgeons were in the habit of removing at the same time both the testicle and its envelopes, when they decided upon performing an operation for the cure of the disease in question, the distinguished professor of Montpellier is not the only one who has made the remark, that in the midst of this singular disorganization, the genital organs will in most cases be found to be unaltered, nor was he the first who made the suggestion, that they ought to be preserved, and that we should confine ourselves to the removal of the degenerated tissues.

#### § I.

A number of *ancient authors*, confounding sarocele and other diseases of the scrotum under the name of *fleshy hernia*, have expressly directed that we should respect the testicle when we find it sound in the midst of the diseased tissues. “Let the skin be cut with a razor, after which the carnosity which you will find there,

must be separated from the testicle (coillon), which latter is to be left undisturbed if it is not injured." Although upon the occasion of a fact similar to the one now under consideration, M. Roux (*Mélanges*, &c., p. 233,) had already proclaimed the principle upon which Delpech has so earnestly insisted, the case described by this last author is, nevertheless, one of the most remarkable which had been then known. A man named Authier had for a long time been afflicted with an elephantiasis of the scrotum, which weighed, it is asserted, about 60 pounds. The surgeon preserved as large a quantity of integuments as he was enabled to procure about the root of the tumor, and from these formed various flaps, which he used all his efforts to shape in such manner as to enable him subsequently to envelope the testicles and penis in them. He afterwards brought down the upper tegumentary flap, and placed it around the penis as if to form a sort of cap for it; he then brought the lateral flaps in the same manner over the testicles, and succeeded in this manner by means of numerous points of suture, in constructing a new scrotum, and afterwards a kind of sheath for the copulative organ. This operation, apparently, was attended with complete success. But the patient, who caught a cold also, in going from Montpellier to Perpignan, was seized at the expiration of a few months with an internal inflammation which proved mortal.

## § II.

M. Larrey states that he performed, in 1816, in the presence of MM. Ribes and Puzin, an operation nearly similar to the preceding, or differing from it at least only in this circumstance, that the tumor was but from five to six inches in diameter. The same surgeon, it would appear also, had recourse to this operation when he was in Egypt, where he has seen tumors of this description which would weigh, he thinks, 100 lbs. It would appear, moreover, that the operation which made so much noise at the time, and which Imbert de Lones performed on the minister Charles de La Croix, was for the cure of a similar disease, and that instead of sacrificing the testicle they might have restricted themselves, like Delpech, to a simple *ectomy* of the scrotum. In *ectomy* of the scrotum, the object in view being to remove the diseased and to preserve the sound parts, it is easy to perceive that the operative process must be modified according to an infinite variety of circumstances, that is, according as the tumor shall be of greater or less volume, occupy one of the compartments of the scrotum only or both at the same time, and according as it shall be found practicable to find in one direction or in another the quantity of integuments required to cover over the parts which we are obliged to denude, but which we do not desire to sacrifice. Thus all that can be said in respect to the operative manual is this, that we must seek at the root of the tumor for sound integuments, in order to cut out flaps that shall be of sufficient size and appropriate form, before we proceed to the ablation of the degenerated mass; that we should then penetrate, while respecting those parts, down to the sheath of the cord or *tunica vaginalis* on the one hand, and to the fibrous envelope of the penis on the other, should the disease have extended in this direction, our object being to divest those parts of

everything that covers them, and to leave nothing behind of an altered character; it being well understood also, that if we should find a serious lesion existing in the seminal glands, they should be extirpated at the same time. An alteration which we must then prepare ourselves for, is the extreme elongation of the testicular cords; the point to ascertain is, if this would be a sufficient justification for extirpating the testicles if they should in other respects be sound. Delpach says that it is not, and that the parts will soon re-acquire their natural position. I believe with him, that M. Key might, in fact, have been enabled to preserve the testicles in the patient under his care in 1831, and from whom he removed an enormous scrotal tumor. May we not say the same of the Malabou operated upon, March 27th, 1830, by M. Clot? "The tumor weighed 110 lbs., exclusive of a considerable quantity of serosity which ran out during and after the operation." Though where so great a mass existed as this it might not have been any longer possible to attempt the preservation of the testicles, this however might have been successfully accomplished, I think, in the patient from whom Raymondon removed a tumor of the same description, but which weighed only 29 lbs. The Egyptian patient of M. Clot, however, was completely restored.

### § III.

Should the elephantiasis occupy the *penis* only, we might detach the corpora cavernosa from the tumor, and then construct an envelope for the organ with flaps borrowed from the scrotum, (see *Diseases of the Penis*.) In most patients operated upon, the penis buried as it were in the midst of the mass, has had to be laid bare at the same time with the testicles. It was independent of them, however, in the case of the young man whom I shall presently speak of, and I was enabled to preserve it. with the intention of afterwards treating it by compression. The operation, moreover, in my opinion is positively contraindicated in all cases where the disease is not perfectly circumscribed and absolutely localized, and where the bistoury would be obliged to cut down upon tissues that are already indurated or degenerescent.

In conclusion, the general rule which we are allowed to lay down in ectomy, is the following: *to remove the entire substance of the degenerated tissues, and to leave intact the important organs, if they have preserved their natural state.* As to the dressing, no other remark is to be made except that the flaps of the wound are to be re-applied with the greatest degree of accuracy possible, over the parts which they are destined to cover, that the suture, either the twisted or simple, is almost indispensable for maintaining them in perfect coaptation, and that the lint or graduated compresses ought to surround and make moderate compression in a uniform and regular manner over their whole external surface, in order that no void may be left between them and the subjacent layers.

### § IV.

Moreover, details of cases of tumors of this description are very numerous at the present day. M. Clot (*Revue Méd.*, 1833, t. IV.,

p. 39,) states that he extirpated one successfully in 1833, which was sixteen inches in length and twenty-six in circumference. A similar case to the one related by Dionis was noticed in 1759 by Mehée de La Touche. Two observations of Morgagni are referable to the same disease. In the patient cited by Schulte, the tumor weighed over fifty pounds, that of Lajoux eighty-three and a half, and Chlopert describes one over eighty. That mentioned by Hale still weighed thirty-six and a half pounds after it had been extirpated. M. Caffort extirpated one successfully two feet six inches in circumference and was enabled to save the testicles, (see the detail of these facts in the *Memoir of M. Caffort.*) The operation performed on the 21st Oct., 1831, by M. Gaetani, (*Gaz. Méd.*, 1835, p. 77,) for a tumor weighing fifty-six pounds, and in which the testicles were preserved, was followed with complete success. M. Pruner (*Ibid.*, p. 78,) was no less fortunate in another case. The patient in whom M. Gaetani removed one weighing 120 pounds died on the following day. M. Chervin, (*Ibid.*, pp. 77, 78,) who mentions one of these tumors of the weight of 165 pounds [!?] says that the operation has been twelve or fifteen times performed at St. Christopher and Demerara, and proved fatal in a number of instances. It would appear that M. Weis and M. Mott (*Gaz. Méd.*, 1835,) have also had recourse to extirpation. I performed it myself (*Lancette Franç.*, 1835,) in one instance, in 1835, at the hospital of La Charité, in an adult aged twenty-eight years. There was a double hydrocele; I saved the testicles, and the patient, after his wounds had become cicatrized, died six weeks subsequently of repeated attacks of erysipelas upon his thighs.

#### ARTICLE IV.—CASTRATION.

Castration is an operation which for a long time since has not been had recourse to, except for the purpose of relieving serious diseases of the generative gland. We no longer find among us those who excuse Semiramis for having castrated men of weak constitution in her domains, for the purpose of having no others than children of robust fathers; nor others who maintain, with Brunus of Longo-Buco, that Seigneurs have the right to mutilate their domestics in this manner, in order to confide to them with greater security the guardianship of their women. Even in Italy itself, there are none who do not now proscribe the cruel process which had been introduced into that country under the pretext of imparting a more harmonious and musical voice to their men. Under this point of view castration is no longer in use except among the Orientals, and in countries where polygamy and slavery are still permitted.

#### § I.—*Indications.*

As a *therapeutical resource*, castration has been made use of for the *radical cure of hernias*. It was very much in use formerly, although G. de Salicet had already condemned as ignorant persons those who practised it in his time, and though at the epoch at which de Cantemire wrote, the Albanians themselves looked upon it as unnecessary and dangerous. At present it is not recurred to but in

*diseases of the testicle* which are considered incurable. It is, for example, employed when a bruise, laceration, or any traumatic lesion whatever, has effectually disorganized the testicle, or when this gland has become the seat of a destructive suppuration, or of a scirrhouss, cerebriform, colloid, melanotic, or merely tuberculous degenerescence. In order that it may present some chance of success, it is important that the disease should be still local and not have extended to the viscera, and that no trace of it can be found elsewhere. A patient who had an erectile tissue in the testicle, and who got well of the operation, died in consequence of a similar tissue in the brain, according to the statement of M. Denis, (*Journ. Hebdom. Univers.*, t. XIII., p. 369.) Even where the internal organs appear to be sound, it would be imprudent to castrate if the cord should be found to be implicated to a great distance in the ring. Nevertheless, if the degeneration should be of a colloid or tuberculous character, or the result of previous chronic inflammations, and without complication of scirrus, or encephaloid or melanotic tissue, we might attack the cord in the iliac fossa, as Le Dran and M. Naegelé did, and as I have done in three instances with success, or we might go as far at least as to the depth of the inguinal canal, as was done by La Peyronie.

### § II.—*Operative Methods.*

The ancients performed castration in four different ways in those healthy persons that were to be transformed into eunuchs. Their method by *attrition* consisted in making violent bruises upon the organ in order to bring about its atrophy; *ecrassement* was performed by placing it between two pieces of wood; while *arrachement*, or *tearing the organ out*, (*déchirure*), or finally, *excision* were very frequently preferred. Of these methods, which have been partially retained in the veterinary art, the only one which remains is the last, and which Paul, in human surgery, denominates *ectomy*. In all the processes the patient is laid upon his back as in the operation for strangulated hernia.

A. *Method of M. Maunoir*.—M. Maunoir, a surgeon of Geneva, proposed at the commencement of this century, to get rid of saccocle without removing the testicle, by laying bare the root of the cord, in order to come down upon its vessels and to be enabled to tie them. According to him, he obtained in this manner a number of cures. A similar operation, attended with a successful result, was reported to the Academy of Medicine; but in a patient of mine at the Hospital of La Charité, in 1838, the operation was attended with no benefit. Moreover, if it is presumable that it may succeed in some cases of degenerescence, produced by a simple chronic inflammation, reason would authorize us in believing that in true saccocle it would be found insufficient.

B. *Method of M. Morgan*.—In England, a somewhat different mode is made use of. M. Morgan (*Arch. Gén. de Méd.*, t. XVII., p. 613) recommends that we should attack the vas deferens itself instead of the vessels. MM. Lambert and Key, (*Lancet*, 1828, vol. II., p. 176,) who have adopted the principles of this surgeon, each relate a successful case in its favor. After having laid bare the sper-

matic cord, they search for and isolate the seminal duct, and excise from it a segment of the length of one to two inches; the wound should be immediately closed up, and the final cure is afterwards effected gradually. Did one or the other of these processes enable us to bring back the organ in some cases to its primitive condition, and to preserve its functions, they would most undoubtedly deserve to be made trial of, notwithstanding their uncertainty; unfortunately this is not the case, and I very much doubt that these processes will ever acquire the consideration in surgery which some persons seem desirous to accord to them.

C. *Ordinary process.*—Castration, properly so called, comprises three stages which are quite distinct: 1st, incision of the envelopes and isolation of the sarocele; 2d, the section of the cord and the application of hemostatic means; and 3d, the dressing.

I. *Isolation of the Tumor.*—*a.* When the *integuments continue sound*, and have not contracted any close adhesion with the tumor, and that the latter has but little volume, it is unnecessary, as had already been remarked by *Paul*, to excise a flap from them. In other respects the division may be made indifferently almost in any way, either commencing by taking up a *fold of them*, or by *cutting from the skin to the deep-seated parts*, as most modern practitioners do. In whatever manner performed, it is requisite that this incision should be prolonged to a slight distance above the ring, and descend to the lower part of the scrotum. Though there may be somewhat less advantage in stretching with the left hand the integuments on the front part of the tumor, while they are being divided, than in grasping it on its posterior side, as *Dupuytren* recommends, this however is a mere matter of choice much more than of necessity. When the skin and tissues beneath it are incised, nothing is easier than to isolate the testicle with free manipulations, either by means of the fingers, after the manner of *B. Bell*, or with the scissors, or what is infinitely preferable, with the convex bistoury, until we have passed around its whole circumference. For this purpose the assistant attends to the lips of the wound, while the operator with one hand grasps the tumor, or vice versa, in order to stretch the parts, to separate them in a proper direction, and to destroy their adhesions by means of the bistoury in the other hand. The only precaution necessary to be observed, is not to carry the instrument too near the penis or the septum of the dartos muscles, from the danger of wounding the urethra or the testicle upon the other side.

*b.* A number of surgeons advise to proceed always in this manner, whatever be the size of the sarocele, provided the skin is not diseased. In this there would be serious inconveniences: the method advocated by *Sharp* and *De la Faye*, and which *Paul* also adopted, and which consists in removing a portion of skin at the same time with the testicle, in all cases where the volume of the cancer exceeds certain limits, is unquestionably preferable. In such cases an elliptical incision, to be prolonged like the preceding, from above the ring to the lower part of the scrotum, is to be made and to include in it, as is readily perceived, a cutaneous flap of greater or less breadth, according as the sarocele is of greater or less dimensions.

*c. Aumont*, apprehensive of finding the pus stagnate in the bottom

of the wound, wishing also to avoid the necessity of leaving a cicatrix in front, and believing also that the alterations of the skin are more frequently met with below than above, has proposed to place this incision on the lower side of the tumor, and not on its anterior surface as is generally done. There can be no doubt, in fact, that we can adopt this course, as I have seen M. Roux do, and as I have done myself; and that this process is in some degree even necessary when the integuments are perfectly sound in the part where they are usually incised, but altered in the opposite direction; but would it not be absurd to attach any importance to the circumstance, that after an operation of this kind the cicatrix would be placed rather behind than in front, under the pretext that it is more visible above than below? Experience has moreover sufficiently shown that the pus, in adopting the ancient method, will always readily escape through the inferior angle of the wound; moreover the process of Aumont, from its not enabling us also to isolate the cord into the inguinal canal with as much facility as by the other method, possesses in this respect so serious an inconvenience that I have seen M. Roux sincerely regret having made use of it.

II. *Section of the cord.*—As soon as the sarocele is dissected, and the cord laid bare to beyond the limits of the disease, the surgeon should attend to the separation of the parts which he designs to remove. This is the point upon which there has been the greatest variety of opinion among practitioners.

*Two methods*, even very distinct from each other, have resulted from this want of harmony. In one the cord or its vessels are tied before proceeding to its section; in the other a course diametrically opposite is adopted, and each method comprises a great number of different processes.

a. *Ligature of the cord in mass.*—Paul of Egina, after the manner of Celsus, constricted the whole cord between the ring and the diseased mass, in a strong ligature. The majority of operators at every epoch have proceeded in the same way; but there are those who, after the manner of Purmann, assert that the ligature ought to be placed as near as possible to the ring, while others, like Barbette and Bertrandi, apply it immediately above the epididymis. Some again, like Haenel, place it on an intermediate point. Though there may be those who, after the manner of Franco and Pearson, tighten the ligature immediately with as much force as possible; there are many on the contrary who, like O. Acrel, make such a degree of constriction upon it only as will be sufficient to interrupt the flow of blood. There are others again, as Gauthier for example, who even only make constriction upon the ligature gradually, renewing this every day until it has completely cut through the tissues. Paré and Heister (*Thèse de Haller*. French trans., t. II.) recommend a ligature several times doubled to be passed through the cord, so as to tie the two halves of the latter separately. Ravaton, with a view of leaving the vas deferens entirely free, places his ligature in the manner of Paré, but he constricts only that half of the cord which seems to him to include the vessels. Some surgeons finally, with Birch, as quoted by Sprengel, apply a precautionary ligature very high up and another an inch lower down, by means of which latter they strangu-

late the vessels before excising the parts below. It is to be remarked moreover that Theden and Flajani have deemed it advantageous to interpose a small compress between this ligature and the spermatic cord, while Pelletan prefers merely a piece of sheet-lead.

*b. A separate ligature on the vessels.*—Those who amputate the testicle at first differ, nevertheless, on the subject of the treatment afterwards required by the cord. Cheselden having remarked that a ligature applied upon the cord had, by gliding in front, made pressure upon the principal vessel, and had thus suspended the flow of blood, was one of the first to propose that its arteries should be ligated separately. Le Dran recommends that we should surround the cord with a precautionary ligature, and afterwards make pressure upon the vessels with the fingers at some distance below, and that we should not tighten the thread except in cases where the pressure had proved insufficient to arrest the hemorrhage. White and Korb state that they have succeeded by imitating the process of Le Dran. J. L. Petit applied a small graduated compress upon the ring, without employing any ligatures; while Pouteau confined himself to keeping the end of the cord turned back upon the pubis. Runge, after having carefully dissected it, twisted it several times upon itself before separating the testicle from it, and also dispensed with the ligature. Finally Smett and Schliting maintain that such precautions are useless, inasmuch as men who castrate themselves in a fit of anger or despair, make use of no means to arrest the flow of blood, and yet nevertheless do not die of hemorrhage.

*c. Appreciation.*—It would be erroneous to suppose that these various opinions are no longer in existence at the present day. The ligature in mass has numerous partisans, though on the other hand there are many surgeons also who only isolate and ligate the vessels separately before dividing the cord. 1st. Bichat (Roux, *Melanges*, &c., p. 230) for example, and M. Roux and M. Chas. Bell, have recommended that we should divide the cord down to the vas deferens, and then to grasp and ligate its arteries before making the section of the duct. Finally, others detach the saccule, as soon as it is separated from its envelopes, and immediately afterwards search in the upper end of the cord for such vessels as might bleed, either by means of a hook, or tenaculum, or with the forceps. As in the greater number of patients, the artery or arteries of the cord are of such inconsiderable size, as to lead to no apprehension in leaving them to themselves after having divided them, it is readily conceived that friction after the manner of Le Dran, compression as made use of by J. L. Petit, and torsion or reversion by Runge, has been found to answer, and might be made trial of almost without any danger, by any person who should desire to do so. Nor can it be disputed also that the ligature, after the manner of Bichat or of Desault, Boyer, Dupuytren, Delpech, and MM. Roux, Mott, and Serre. (*Compte Rend. de la Clin. de Montpellier*, 1837,) who adopt the principles of Cheselden or of Bromfield, might succeed equally well. 2nd. Nor should we throw any obstacle to the accomplishment of the cure, by *embracing the cord* in its totality or only in part, and in making upon it direct or graduated constriction. The important point in this matter therefore, very naturally would be, to know which in

reality is the most advantageous or most prudent, which is the easiest and most certain, whether to ligate in mass, or not to apply the ligature until after having detached the organ. The opponents of the first method, Siebold among others, adduce as an argument for its rejection, the danger of comprising in the same ligature the vas deferens, the nervous branches of the renal plexus which accompany it, the branch furnished by the genito-crural nerve, together with all those other tissues which are not required to be included; also they contend that a ligature of this kind must produce violent pain, and incur the risk of causing convulsions or even tetanus, and finally, that the ligature is sometimes very slow in cutting through the parts, and protracts to a considerable degree the period at which it may be removed from the wound. Some have added that the constriction of so great a number of different organs would soon cause the ligature to be relaxed, when it would no longer be found sufficient to close the arteries. To all this it may be rejoined, that immediate strangulation, causes a somewhat acute degree of pain only for a few moments, even though the continuity of the nervous branches and the vas deferens have been divided by it; that hemorrhage has never been seen to take place from vessels strangulated in this manner; that tetanus and nervous symptoms are no more to be apprehended from this method than from any other; that the patient thus treated by Morand, and who died tetanic, owed his disease to quite another cause; and that M. Couronné, (*Revue Méd.*, 1827, t. III., p. 420,) moreover, has published the case of a man, who also died of tetanus, in consequence of castration, even though the cord had not been tied in mass. 3rd. I have seen this operation performed at the hospital of Tours by M. Gouraud at least twenty times in the space of four years, also by MM. Richerand and Cloquet at the hospital of St. Louis, by M. Bougon at the hospital of the School of Medicine, and by many other practitioners besides; I have performed it myself more than thirty times, and in all these cases, which amount to more than 100, the ligature in mass was used without there ever having resulted any inconveniences which could be reasonably imputed to it. Employed also by M. Sachs, (*Rust's Handbuch der Chir.*, vol. IV.,) who operated in this manner on both sides, by M. Robert de Chaumont, (communicated by the author,) and by M. Nægelé, Sommé, (*Bull. de la Fac. de Paris*, t. VI., p. 25,) M. Gama, (*Sornay, Thèse*, No. 86, Paris, 1837,) M. Golfier, (*Presse Méd.*, t. I., p. 452,) and M. Pasquier, the ligature in mass, which M. Bousson, (*Bull. Méd. du Midi—Journ. des Conn. Méd.*, t. IV., p. 365,) has also seen performed five or six times at Bordeaux, and which is no less approved of by M. Cazenave, is therefore at the present day the only method which actually deserves to be received into general use. The experience and arguments of Mursinna, Wilmer, Loder, and Dietz, who are quoted by Sprengel, have moreover fully refuted the objections of Siebold on this point. It is true that with the separate ligature, if the proper precautions are taken, success is no less certain; but it is evident that it presents more difficulties, that we have in some cases trouble in finding the vessels, that the explorations to which we are then obliged to have recourse, uselessly prolong the operation, and that quite a copious hemorrhage, has in more than one

instance come on from the end of the cord after the dressing has been applied. 4th. Another accident which also might create alarm, as I had occasion to notice in a patient operated upon by M. Roux, is peculiar to this operation. While this professor was looking for the artery, the seminal cord itself escaped from his fingers, and slipped underneath the integuments which had been preserved; he hastened to seize it with the dressing forceps, and to bring it outside in order to pass a ligature around it, which was applied somewhat negligently; the bleeding appeared to have been arrested, but towards the evening copious hemorrhage came on, which returned several times during the night and threatened to become fatal.

d. Authors have spoken a good deal of this *tendency of the cord to retract itself*; hence comes their provisional ligature and a multitude of other precautions. Nevertheless none of the constituent portions of the cord are contractile. The spermatic vessels and vas deferens, after having been a long time drawn upon and elongated, appear to be the only portions which are capable of retracting towards the belly after they have been relieved of the weight that dragged upon them. As to the tunics which unite them together or envelope them, we cannot perceive how these can effect the slightest retraction in that direction. The fibres of the cremaster, at the utmost, might be capable of drawing the parts back to the distance of a few lines. It is incorrect, therefore, to say that the cord, after having been once divided, must necessarily recede to a considerable distance upwards. It has not been at the present time only, however, that any tendency of this kind had been denied to it. M. Flaubert a long time since had noticed the error which I have just pointed out, and M. Sénateur has collected arguments and facts well calculated to refute it, at the same time that M. Chas. Bell, on his part, opposed this idea in England. The following, in fact, is what takes place: If the saccule is ancient or voluminous, or if in any way whatever the cord has undergone a considerable degree of elongation, it has, in fact, as soon as it is divided, a tendency to regain the interior of the inguinal canal, but its constituent portions then yield only to their appropriate elasticity, and have no other result in view than that of becoming approximated somewhat nearer to their primitive position. In all cases where this elongation has not taken place, and where the degenerated testicle has remained at the same distance from the ring, no result of this kind is seen and no apprehension can exist of the retraction in question. It may require some attention, in fact, only in a small number of persons, as, for example, where the disease does not admit of our separating the cancerous mass at an inch at least from the inguinal opening; from whence it follows, that it is hardly necessary to take it into consideration so long as the tumor has not implicated the cord itself.

e. Arnaud, Maréchal, Garengeot, Bertrand and other practitioners, considering that the root of the cord is found to be enveloped in fibrous tissues and lamellæ that are not distensible, proposed to divide the ring in order to prevent the strangulation of the cord, a strangulation to which they attach a number of dangers, but which must necessarily be very rare, since no practitioner in our times makes

any mention of it, although the advice of Garengot has been generally neglected.

*f.* As to the manner of *dividing the cord*, it has necessarily varied but very little. The *red-hot iron*, which was preferred by Roger of Parma, Brunus, &c., no longer finds any partisans. *The scissors* used by Scultetus are manifestly less suitable than the *bistoury*. In making use of this last instrument it is quite unnecessary to incise the organ by a bevelled section, as recommended by Le Blanc. While an assistant supports the testicle, the surgeon grasps the spermatic cord with his left hand a little below the ring, or at the point which sustains the ligature, and divides it with a single cut from behind forwards, or from before backwards, and perpendicularly to its axis. It is not probable that hereafter any person will recommend that the ligature should be allowed to perform the duty of cutting its way, by degrees, through the parts, as in treating a polypus, and as is recommended by Runge or Le Blanc.

III. *If the flaps of the wound* should be too large, it would be advisable to exsect them immediately. Otherwise we should incur the risk of their rolling up inwards, and ultimately rendering the cure tedious and difficult. This disposition in the sides of the scrotum to roll up on their inner surface appears to be naturally explained by the anatomical arrangement itself of its tissues: the remains of the cremaster, should this muscle have not been completely destroyed, together with the layer formed by the dartos, from their both being endowed with a certain degree of contractility, retract more or less upon themselves and necessarily draw upon the cutaneous tissue in the same direction.

D. *Process of Zeller or Kern*, (Rust's *Handb. der Chir.*, vol. IV.) —A person of the name of Acoluth, having a special dread of any kind of hemorrhage, proposed to draw the tumor downwards, and to strangulate it with a silken ligature placed above its root, in order that its separation might take place gradually. Haly Abbas, and before him also Aristotle, who had also given the advice, recommend that we should immediately excise the testicle with a razor below the ligature. In Germany a different process is adopted. Zeller, upon the strength of the fact that certain maniacs and others have themselves amputated their testicles, together with the scrotum, with a single cut, suggested that this method might be systematized and transformed into a regular process. With this view he grasps the saccocoele with his left hand, causes the skin to be drawn back a little at the upper part, by the hand of an assistant, and removes with a single cut of the bistoury or knife the entire tumor divested of its envelopes, and afterwards, in order to prevent the hemorrhage, merely keeps at the bottom of the wound a sponge saturated with cold water. A surgeon of Vienna, who has since been desirous of bringing this method into repute, has employed it in a great number of instances, and according to him, with unvarying success, by engrafting upon it, however, an important modification, since he adopts the precaution of not abandoning the cord until he has surrounded it with a strong ligature. The method of Zeller enables us to remove the testicle with surprising rapidity, and makes castration an operation as simple as it is easy. It appeared to me moreover, in the two

patients who were operated upon in this manner by me, that the integuments, from not having been dissected, allowed of the wound being closed up with much more rapidity than by the ordinary method. But it renders the ligature in mass upon the cord more difficult, and evidently can be no longer applicable when the tumor is somewhat voluminous, or when its envelopes are altered.

E. *Process of the author.*—If the envelopes of the tumor are sufficiently pliant and sound to be drawn backwards, I take up a fold in them which is kept tense and flattened by one assistant, while another disengages, raises up, and draws the sartocele to the front; I then pass a ligature at distances of four to four lines through the double tegumentary tissue, and as near as possible to the tumor, taking care to pass one of the four portions under the cord above the diseased parts, and to strangulate this last upon a graduated compress. Then removing the entire mass by means of the bistoury, as in the process of Kern, I have nothing more to do than to knot the threads, in order to complete the suture and the operation. Two patients whom I treated in this manner, recovered perfectly.

F. The ordinary process, moreover, may be very easily combined with the *temporary ligature* upon the cord, either directly or indirectly. Being passed through the skin or around the cord, after it has been laid bare, all that is necessary is to fasten it by a knot, and afterwards a bow knot, on some supple substance; we may in this manner loosen or tighten it according as it may be required, and can withdraw it from the third to the sixth day.

G. *Ilio-Inguinal Sartocele.*—The testicle which we are about to remove, in place of occupying the scrotum, or hanging outside, may be confined and arrested in the tissues of the walls of the belly, at the interior portion of the inguinal canal; and this may take place from the individual never having had the testicle in the scrotum, or from its having accidentally ascended to that point, as occurred in a remarkable case mentioned by Rossi, or it may be because the cord is implicated in the disease of the testicle. However this may happen, it may be transformed there into the condition of sartocele, instances of which are related by Chopart, Boyer, and M. Rheinleider, on the authority of Robert, (*Journ. des Prog.*, t. XIII., p. 125.) It may readily be conceived how delicate and dangerous the operation must be under such circumstances. In the first place, before commencing with it, how can we determine precisely the limits of the disease? Then again it is to be apprehended that in performing it we may open into the peritoneal cavity, contrary to our intentions, as happened to M. Naegéle, (*Arch. Gén. de Méd.*, t. XIII., p. 423; *Journ. des Prog.*, t. XIII., p. 156,) or that we may even be obliged to do this designedly, in order to remove the entire disease. In such cases, therefore, we must incise layer by layer the whole thickness of the tissues which envelope the tumor, and isolate it little by little by a careful dissection, keeping constantly present to our minds the proximity of the peritoneum, the epigastric artery, and even the iliac vessels. Upon the supposition that we might apparently lay bare the cord with ease, it would be more prudent, under such circumstances particularly, to apply to it the ligature in mass, than to attempt to strangulate its vessels separately. Should a chronic phlegmasia have

blended its different lamellæ with the surrounding layers, this mode of applying the ligature would be still more suitable, and the thread ought to be introduced by means of a curved needle. In the case of Rossi, related by M. Piussan, (*Thèse*, No. 215, Paris, 1825,) it became necessary to divide the cord at more than three inches above the ring, yet the patient recovered notwithstanding. I have performed this operation three times. In the three I laid open the whole anterior wall of the inguinal canal, and was obliged to isolate the cord as far up as into the iliac fossa, at which part I applied to it the ligature in mass. I did not find the operation attended with any serious difficulty. The tumors were encephaloid. One of the patients has continued well since 1836; in a second, a tumor of the same description developed itself in the groin at the expiration of a year; of the third, I have received no intelligence since he was discharged from the hospital. Should the inguinal canal only be implicated with the scrotum, the operation is then still practicable.

H. Whether the ablation of the saccocœle has been effected by this or that method, the wound always contains a certain number of vessels which should engage the attention of the surgeon before he proceeds to the dressing. Even if we set aside those of the cord, we find one or two external to this, and these are the vessels which are usually the largest in size; some also will be found at the lower angle of the division, and which come from the pudic artery by the superficial artery of the perineum; finally, it frequently happens that we meet with one on the inner side, and which is one of the branches of the artery of the septum of the dartos muscles.

I. In most cases these vessels cease to bleed at the moment when the operation is terminated, and in some persons it will prove unavailing to attempt to find them afterwards; on which account it has been recommended to make use of the ligature or torsion to these vessels in proportion as they are opened. It rarely happens, however, that a hemorrhage takes place from neglecting to tie them, provided they have not shown themselves when the sponge is applied to detect them on the surface of the wound. Schmucker (*Rougement, Bibl. du Nord*, p. 38), omitted in one instance to apply the ligature to the cord, but no hemorrhage followed. M. Puchot (*Thèse*, No. 207, Paris, 1835), noticed the same thing in a maniac. A patient, in whom the testicle was hanging down from a wound, had it removed on the fourth day; the vessels were not tied; the wound was united by means of the whip suture, and the patient recovered (*Roulot, Journ. des Conn. Méd.-Chir.*, t. III., p. 76.)

II. Whether, however, the ligature has been applied to the vessels or that we have not considered it necessary to pay any farther attention to them, it must be recollect that in a considerable number of cases the dressing becomes wet with blood at the expiration of three or four hours, or in the course of the night following the castration, without, however, any actual hemorrhage having taken place.

I. Dressing.—I. The ancients had recourse to the *suture* after the removal of the testicle, and frequently endeavored to effect union by the first intention. From the termination of the seventeenth century, however, no other treatment scarcely has been used but that by

second intention. A considerable number of English, German and American surgeons, and with them Delpech and other practitioners in the south of France, have, it is true, again endeavored to bring into repute the first named method, but I have not found either in the work of M. Serre nor in foreign publications, any well established fact in proof of the perfect cicatrization of a wound of this description by first intention. Of the three patients operated upon by M. Serre, an account of which has been published by M. Alquié, (*Gaz. Med.*, 1837, p. 476,) one was cured in 15 days, the second in 34 days, and the third in two months and a half! In the first place, it would be necessary that there should have been no ligature employed, that we should have restricted ourselves to the torsion only of all the arteries, and that we should finally have been enabled to place the lips of the wound and the integuments which had been preserved, in perfect contact with the subjacent tissues. The suture, either simple or twisted, would in such cases become absolutely indispensable; hence would arise a greater degree of pain and numerous difficulties to be overcome unless we followed the process I have pointed out.

II. *The usual practice* is attended with infinitely less embarrassment. A piece of fine perforated linen, besmeared with cerate, is spread out like a veil over the entire traumatic surface. Over this are immediately applied some small balls of lint. The sides of the scrotum are also padded with lint in order to prevent their friction against the upper part of the thighs, while several plumassaeux cover over the whole. Long compresses and then a large suspensory or a double spica complete the articles of dressing. The accidents to be apprehended are the same as those which occasionally succeed the other great operations in surgery, and require the same treatment.

a. *Hemorrhage*, when it takes place, is far from always requiring the wound to be hastily laid open in order to discover its source and to tie the vessels. We shall frequently find ourselves enabled to arrest the bleeding by sprinkling and saturating the dressing with cold water or lead water, and by renewing these applications at least once every hour. If however the bleeding should continue to such extent as to enfeeble the patient, or give rise to the apprehension of an internal effusion, it would become necessary immediately to take off the dressing, remove the clots of blood, and tie the artery or arteries that were not closed up, or in fact to have recourse to tamponing, styptics, and even to cauterization, should the danger be imminent.

b. Should the ligature in mass have been preferred, it is to be apprehended, if the constriction has not been carried so far as to strangulate the tissues completely, that the extremity of the cord will retain its vitality and become transformed into a reddish colored granulation or sort of *cauliflower*, which, as has been remarked by J. L. Petit, and as I myself have seen in a patient operated upon at the hospital of St. Louis by M. Cloquet, may be confounded with the neighboring borders of the wound, in such manner as to give rise to subsequent difficulties. It is however probable that even in such cases the ligature would finally cut through the cord it embraced,

and that the vegetation in question might be repressed by means of astringents or caustics.

c. If in spite of all these precautions the *borders of the wound* should have become *inverted*, we might, provided the suppuration should not be too abundant, endeavor to approximate the sides of the wound to its bottom and keep them compressed in such manner as to effect their adhesion by secondary immediate reunion.

III. If all these precautions are made use of the patient will recover in three weeks or a month, sometimes in twelve or fifteen days, rarely sooner, but sometimes at a later period. Castration in itself is not a serious operation; it causes but very little reaction and is rarely fatal. If however we should insist too strenuously upon immediate reunion it may give rise to a purulent inflammation or a sort of phlegmonous erysipelas, which, ascending along the cord, involves the inguinal canal, and may reach the *fascia propria* or the peritoneal cellular tissue of the fossa iliaca. In some cases also the phlegmasia, though continuing to be sub-cutaneous, will follow the course of the fascia superficialis and spread with this over the whole iliac region, in such manner as to place the life of the patient in imminent danger. Surgical anatomy, a subject which I have elsewhere treated of, (*Anat. Chir.*, t. II., edit. 1837,) perfectly explains this phenomenon.

[*New Practice of Incision into the Tunica Albuginea Testis*.—In cases of *parenchymatous orchitis*, i. e. where, as is occasionally but not frequently seen, the testicle in young men between the age of nineteen and twenty-four, from certain pathological causes, becomes severely inflamed and strangulated as it were, within its investing tunica albuginea, (peri-testis,) and which might and does result in suppuration and loss of the testicle, *M. Vidal de Cassis*, of Paris, has recently recommended a bold practice, (*Journal de Médecine et de Chirurgie Pratiques*, Paris, October, 1844,) which has made some sensation in that capital by the success which has followed it. It consists in making incision, layer by layer, to the extent of nine lines down to the albuginea, which was readily divided, and by which the testicle was laid bare. There is no serosity within the tunica vaginalis; union without any suppuration takes place between the testicle and the vaginalis at the incision. In one case, in which it proceeded from a debauch after the cure of a blennorrhagia, the latter returned as soon as the division of the albuginea was made. In M. Vidal's two cases given there was a cure effected without any previous depletion, and in support of this treatment we have a case of M. Cullerier, (*Ib.*,) where the symptoms of pain in the part and cord were aggravated by bleeding, poultices, purging and extensive leeching to the cord, (viz: twenty-five leeches,) and in which nothing but division of the albuginea checked the disease. M. Vidal has already treated, by his mode, fifteen cases with success, (vide also Cormack's *Monthly Journal*, &c., Jan., 1845, pp. 70, 71,)

*New Treatment of a species of Fungus of the Testicle*.—Mr. Syme of Edinburgh (Cormack's *Lond. and Edin. Monthly Journ. of Med. Science*, January, 1845, p. 1, &c.,) proposes in cases of those well known fungoid growths of the testicle described by Lawrence, (*Edinburgh Medical and Surgical Journal*, year 1808,) and which pro-

cure some ease to the patient by ultimately making their way by ulceration through the scrotum, to discard escharotics or the knife, as hitherto used, but in lieu thereof, to make an elliptical incision freely through the teguments of the scrotum, and after excising the hard and corrugated portion around the fungus, and dissecting these teguments back, and detaching them from their connections, and abrading the edges of the wound, to reduce by a sort of taxis the hernia-like protruded excrescence within the scrotum, and then to unite the lips of the incision over the included tumor, by stitches. The pressure he has found, by this treatment, will in a short time effectually cure the disease, by causing an absorption of the *exuberant granulations*, which the microscope proves this tumor to consist of. The brown divergent striæ are found to be the *tubuli seminiferi*, and the white substance which separates these tubuli to some distance apart, is ascertained to be organizable lymph, which being absorbed, leaves the former (the tubuli) and the testicle to which they belong, in a natural state. The surface of the fungus itself being also ascertained, as he says, by Mr. Goodsir, through the microscope, to be of a granulating nature, readily unites with the corresponding internal raw surfaces of the integuments. The parts under this treatment speedily regain their normal size and condition—a result which certainly would not have been anticipated, if we were to be guided by the received notions on all fungoid growths. The discovery of this practice by Mr. Syme, should it be confirmed by future trials, shows the valuable acquisitions probably which are yet in store for therapeutics by the light to be thrown upon morbid structure by the microscope, as well as by organic chemistry.

*Scrotal Tumor.—Diagnosis of a Tumor in the scrotum of a living adult, containing debris of a Fœtus.*—The honor of establishing one of the most delicate points of diagnosis, that has ever occurred, fortunately fell to the lot of one of the most learned, practical, and discriminative of living surgeons, our author, M. Velpeau, viz., in 1840, at the celebrated hospital of La Charité, to which he is attached, and in the year immediately succeeding that (1839) in which this work was published. It is unnecessary to remark how much sensation this case created throughout the learned world, and it would be quite superfluous for us to add our own individual homage to the honors that have justly accrued to our distinguished author for this brilliant result of that masterly skill, ready tact, and close familiarity which he possesses of the most complicate anatomical relations of parts, both in their pathological and physiological conditions. Of the truth of this remark, this diagnosis unprecedented by any analogous circumstances in the history of surgery, furnishes a most conclusive evidence. The patient, whose name was Gallochot, aged 21, (see an interesting account of the case, as drawn up by Dr. N. Victor Izokalski, in the *Gazette des Médecins Praticiens*, de Paris, and copied into the *Archives Générales de Médecine de Paris*, 3<sup>e</sup> et nouvelle série, tome VII., 1840, p. 299 to p. 313; see also the notes appended to the case by the Editors of the Archives, *Ibid.*, loc. cit., p. 302 to p. 313,) was received into La Charité, Jan. 18, 1840, with a tumor of the size of a turkey's egg, on the right side of the scrotum. It was perfectly insensible, and had, he related on the authority of his

mother, been in that state, and of the same size from his earliest infancy, which assertion there was reason to believe was true, as it was confirmed by the family physician.

The fact of the insensibility of the tumor, which the patient said gave him no pain, even when he thrust a knife through it, was also confirmed by the numerous cicatrices upon it. The position of the tumor was external to the scrotum itself, its shape of a rounded form, and the skin which covered it was white and strongly contra-distinguished from the deep brown color of the skin of the scrotum generally, both by this circumstance and by the peculiar fine hairs upon it. While the skin of the tumor also was insensible to the touch or puncture, that of the scrotum was exceedingly sensitive. Generally this morbid production had the feel of a fibrous mass of different degrees of hardness. In the midst of its tissue there was perceptible, when it was examined posteriorly, an indurated substance which conveyed the idea of something osseous. At this part were noticed three fistulous openings, through which exuded constantly an unctuous matter, (*matière grasse*,) which resembled neither pus nor serosity. Through one of these fistulous apertures protruded a tuft of very fine hairs, which had existed there before hair had appeared on the pubis. The testicle and epididymis were situated on the inner side and appeared sound, except that they were slightly hypertrophied. The spermatic cord also seemed healthy, and the functions of the parts were unimpaired. The patient said he never had the venereal disease, and the tumor caused him no uneasiness or trouble. M. Velpeau, proceeding in his examination upon the ejective method, (*voie d'exclusion*,) at length diagnosticated a *monstrosity by inclusion*, or a *tumor composed of the detritus of a fetus*. On the 29th of January, 1840, he proceeded to the operation, circumscribing the tumor by a circular incision on the skin of the scrotum, after which, the diseased mass was, after a careful and minute dissection, completely separated from the neighboring parts. The testicle, and even the tunica vaginalis, were both respected, and were in sound condition, as had been beforehand diagnosed. A good deal of blood flowed, requiring three ligatures, after which the wound was neatly closed by four pins secured by the twisted suture. Violent inflammation of the scrotum and febrile reaction ensued, which, notwithstanding active depletory means, ended in death in twenty-four hours after the operation, by means of metastatic abscesses which developed themselves in the chest.

*Dissection of the tumor.*—A transverse incision exhibited several cysts of various capacities and containing different matters. The largest contained a fatty matter of a greyish color, composed of small isolated particles, but united to each other by a gelatinous substance. Another cyst, of a chesnut color, was also filled with fatty matter, of deeper color, and in this was found a quantity of very fine hairs. Others contained a semi-liquid substance, perfectly resembling the vitreous humor in consistence, but of a yellow color. The compact portion of the tumor had none of the normal or abnormal characters of known tumors; it was of a fibrous consistence, but quite soft, and of a rosy tint in its interior. It contained also distinctly recognizable masses of fat. The most remarkable contents of the tumor, and

which were situated near its middle portion, were a *number of bones arranged in different ways and articulated with each other,* (plusieurs os diversement disposés, articulés les uns avec les autres.) M. Demeaux, (an interne of M. Velpeau,) by means of a careful and minute dissection of these, was enabled to isolate them into three groups. The largest one appeared at first to consist of three principal portions, one of them, the most considerable, consisted of an osseous column of great strength and somewhat irregular; from one of its sides projected a prolongation which was curved upon itself in two different directions; on the opposite side were two osseous fragments articulated together; and the whole united to the osseous column just mentioned. The inference was almost irresistible that these bones were those of the pelvis. The second group was composed of long bones articulated to each other by means of a fibrous mass. Among this group was a flat bone. The third group was composed of several flat bones, and of a series of small osseous nuclei, (petits noyaux osseux,) united together. These last were probably the remains of the head and spine. These specimens were transmitted by M. Demeaux to the Anatomical Society, where the diagnosis of M. Velpeau was recognized to have been fully made out.

This case, as well as the diagnosis, are, as we have said, without any known parallel in the annals of surgery. Extra-uterine masses or debris have, however, been found at various periods of life, both in the interior and on the external parts of the body, and have been described by various authors. For a very learned and interesting account of the history of extra-uterine tumors we refer the reader to the observations we have already alluded to, and which are appended to the above extraordinary case by the editors of the *Archives Générales*, (loc. cit. supra.) M. Geoffroy St. Hilaire, the celebrated naturalist, (now deceased) denominates the individual in whom such tumors are found an *autosite*, while the tumor or foetal germ itself is denominated *parasite*. This distinction would seem to apply to their actual condition when discovered, during some period of extra-uterine life, either at birth or afterwards.

What the condition of such union is during *intra-uterine* life, however, or at the commencement of it in the ovary is another question. The Archives' editors consider that there must have been at first, either two distinct and isolated (and, at the time, *perfect*, as we suppose) germs, that one has penetrated into the other, or that both germs were originally united in the same ovule, i. e. as we interpret the editors, were contained in distinct ova and both ova included in one of Graefe's ovules, for example. In either case, however, it is clear that one has been arrested in its development, and that the organization of the other has predominated over the last at some period of intra-uterine existence. But if we suppose *distinct* or separate or isolated existences from the beginning, *ab ovo*, we must, to carry out the principle, suppose two *embryos* either in the state of twins united in separate ova, or together in one ovum, and yet each, in this latter, having an independent existence, so to speak. In the Siamese twins the presumption is, that if distinct ova existed, as must have been the fact, these ova were indissolubly united from the very first moment that the spark of organic life was infused into

them. It would seem, in such cases, that the two organizations, however, though united by a vinculum, must be external to and isolated from each other. Therefore, in the remarkable case under consideration, it is impossible for us to resist the conclusion that the ovum of the perfect individual must have originally contained *within* itself by a species of *involution*, the ovum of the being whose development was arrested and, as it were, crushed in embryo. If the latter was a parasite it was of the *ento-zootic* kind. When both commenced their existence with the punctum saliens, both may have been of equal development or power, though of unequal dimensions, as one was within the other. At all events, it is to us clear that the one which now exhibited itself only under the aspect of an obscure vegetative life, in imperfect portions of a foetus, was contained throughout the whole of its organization, completely within the other: in other words, was at first an ovum within an ovum, i. e. an *ovum in ovo*, or an *imperium in imperio*. Without, however, pursuing this inquiry farther, and which falls more directly within the province of embryology, obstetrics, and pathological surgery than it does within the divisions embraced in this work, it may be observed that the perfect authenticity of the facts in the case of M. Velpau, and the interpretation we have ventured to give in relation to the primitive condition of the individual and of his tumor during intra-uterine existence, are calculated to impart some degree of probability to a narration referred to in the Archives, (*loc. cit.*) hitherto deemed fabulous, and which asserts, on the authority of Gabriel Clauderius, (see Pauli *Observationes raræ, selectæ et curiosæ*, Lipsiæ, 1760, p. 85,) that in the year 1762 the wife of a miller gave birth to a strong and healthy female child with a belly of extraordinary dimensions, which infant some days after its birth was also seized with violent pains and convulsions, and flow of blood from the vagina, from which, shortly after, there was expelled another *perfectly formed and living female foetus followed by a placenta!* The two infants were baptised together and died the day after. For ourselves we conceive this to be scarcely, in any respect, more marvellous than the *detritus* of a foetus within the scrotum of a healthy full grown living male subject.

The fatal influence also which the removal of this apparently inert and insensible mass, had upon the individual in whom it lived, goes still farther to corroborate, that there then existed and had previously been established a primordial and indissoluble organic union between both. The result also would go to show, though the cases are not parallel, that an attempt to divide asunder the vinculum which unites the Siamese twins would, as many surgeons have conjectured, speedily prove fatal to one or both.

*Scrotal Tumor.*—*An irregular, oblong, lobulated, adipose tumor,* eight inches by six in dimensions, situated in the left side of the scrotum of a patient forty-three years of age, and which first made its appearance in 1842, and the true diagnosis of which from hernia embarrassed even MM. Lawrence, Brodie and Travers, was removed in April, 1845, by Mr. Lawrence with perfect success. Mr. Curling, in remarking upon this case and the deception caused by the swelling of the tumor just before stool and when the patient was in an erect

position, explains it very naturally by the accumulation of blood in the parts, from the interruption made by the fœces in the colon to the return of the sanguineous circulation from the tumor and spermatic veins. (*Provincial Med. and Surg. Journ.*, June 25, 1845.) T.]

## ARTICLE V.—DISEASES OF THE PENIS.

### § I.—*Phymosis.*

**A. Varieties.**—The contraction of the prepuce is a disease which presents itself to the operator under three principal forms: 1st. The *congenital* variety is in no other way annoying except in presenting an obstacle to the flow of the urine, or in occasioning, in adult age, the pains which result from it in the efforts of coition; 2d. That which is the effect of *inflammation*, more or less acute, may give rise to accidents of quite a severe character; 3d. In the *accidental* but chronic form, the entire prepuce may be indurated and thickened in such manner as to form a hard indistensible and, as it were, lardaceous or *elephantine* shell, which encases and goes beyond the entire glans penis.

I. If the congenital phymosis is caused, particularly as happens in *infants*, by the excessive elongation of the integuments, no other operation is required than that which is known and performed in the East by the Jews, according to the precepts of their religion, under the name of *circumcision*, and which M. Brueck, (*Journ. Univers. des Sc. Méd.*, t. VIII., p. 185,) does not hesitate also to recommend as a preventive of phymosis and chancres!

II. Nor does that form of phymosis which is produced by an acute inflammation, chancres, venereal lesions or any other cause, require the employment of instruments, except it should constitute too great a difficulty in the treatment of the principal malady, or that we should have found ourselves unable to subdue it by means of topical applications, injections and other appropriate remedies.

III. The third variety has been but rarely met with. When it is ancient and has proceeded to such degree as to render the emission of the urine difficult, it admits scarcely of any other remedy than the division of the contracted periphery. If it were only an elephantine transformation, compression perhaps might be found to answer, and a patient whom I treated in this manner did exceedingly well. In other cases we are obliged to extirpate the entire shell. Under such circumstances M. Kerst first divides the frenum; he then, by means of two vertical incisions, lays open the prepuce into two halves, which he removes separately in the following manner: the prepuce is to be divided by the bistoury down to its inner layer; the surgeon, then drawing upon this, incises it with the scissors as near as possible to the root of the glans penis. By dividing in this manner the tegumentary layers of the prepuce to an unequal extent, we avoid the constant tendency which the inner one has to become turned outwards when both are cut to the same point.

**B. Operation.**—It is to be remarked, moreover, that in performing the operation upon a prepuce having ulcerations upon its inner surface, we incur the risk of having the wound itself undergo

ulceration, and that in such circumstances we must not omit the employment of anti-syphilitic remedies both local and general.

I. *The Dorsal Incision.*—The operation for phymosis, which is one of the most simple in surgery, requires no other articles than a straight bistoury, scissors, a director without any lip, a dressing and a ligature forceps, a plumasseau of lint besmeared with cerate, two or three fine compresses and a narrow band about a yard long. The concealed bistoury of Bienaise, which was employed by Lapeyronie, as well as other special instruments designed for this purpose, are wholly useless.

a. *Ordinary Process.*—The patient is seated on a chair, unless he should prefer the bed. The surgeon glides the director under the prepuce as far down as to the root of the glans penis. The assistant who holds the penis, takes care at the same time to keep the director and skin properly adjusted to each other. The bistoury, guided upon the groove of the director, reaches to the base of the cutaneous fold. The point of the instrument is then immediately turned towards the skin, in order to perforate the prepuce from within outwards, and then to incise it rapidly from behind forwards. The incision, by means of a puncture from the deep-seated parts towards the skin, possesses this advantage, that the patient in drawing back terminates the operation, so to speak, himself, instead of disturbing the operator.

b. Some persons, in order to dispense with the director, introduce the bistoury after the recommendation of *Sabatier*, flatwise between the glans penis and its envelope, proceeding in other respects in the manner just described. There are others also, who in order to avoid wounding the parts upon which we wish to glide the instrument, place a small *ball of wax* besmeared with oil or cerate, on the point of the instrument, which latter having once reached the bottom of the cul de sac, passes without difficulty through the wax at the same time that it perforates the tissues which are to be divided.

c. The scissors are scarcely any longer ever used at present. Being compelled to act upon parts that are very soft, and difficult to be held steady, they rarely make a sufficient division at the first cut. They are consequently not employed except for regularizing the incision made by the bistoury, when this incision has not divided uniformly both layers of the prepuce, or when we wish to give it a somewhat greater length.

d. Some surgeons consider it advisable to adopt other and still more minute precautions, with the view of preventing the wound from extending too far either inwards or outwards. *M. Ricord*, (*Journ. Hebdom.*, t. XI., p. 297,) for example, recommends, when we do not decide upon *circumcision*, that the tegumentary fold should be seized by means of two, or even three dressing-forceps, from its free border down to its root, upon three different points, in such manner as to enable us to stretch it sufficiently to allow the bistoury or scissors to cut through it without the fear of making the layers which compose it slip over each other. Besides the embarrassment of so great a multiplicity of instruments, which exact, moreover, an equal number of assistants, this method would have the disadvantage of being but rarely applicable; when the prepuce is so contracted as to require the operation for phymosis, it would

not admit of the simultaneous employment of three forceps and a cutting instrument.

e. M. Lisfranc, (Margot, *Revue Méd.*, 1838, t. I.,) in order to avoid the angular projections of the wound, proposes that we should confine ourselves to the excision of a semilunar flap, from the antero-dorsal border of the part, which excision he performs by means of scissors, curved on their flat, and which he repeats on several points of the membranous contour, should the first notch not seem to be sufficient.

f. This process might be replaced by the removal of a triangular flap from the contracted circle, should an actual loss of substance be deemed advantageous. This last mode of excision, moreover, would in some respects become indispensable if we had to operate for a phymosis from chronic induration, as I have done in one instance at the hospital of St. Antoine, in a man who had the entire sheath of the glans penis transformed into an actual fibro-cartilaginous shell. M. Roux has seen a similar case. A stony cap (calotte) lined the interior of a prepuce thus degenerated in the patient of M. Sper, (*Lancette Franç.*, t. I., p. 377.) In such cases it might be even advantageous to adopt the process of M. Kerst, and to extirpate the prepuce entire. I would, nevertheless, remark that a patient who was in the same state as mine, and whom M. Voisin, (*Thèse*, No. 205, Paris, 1832,) operated upon, died thirty hours afterwards from *urinary resorption*. But in another case the same practitioner obtained complete success, though the tumor had become prolonged under the urethra, (*Gaz. Méd.*, 1839, p. 89.) A case of elephantine phymosis successfully operated upon by means of the dorsal incision, occurred in 1838 in the hospital service of M. Liston, (*Encyclogr. des Sc. Méd.*, 1839, p. 234.)

II. *The Urethral Incision.*—In adopting the dorsal region for the incision in phymosis, we incur the risk of the sides of the wound being drawn back and separated apart, so as to give rise to the formation of a border which is sometimes very annoying. The excision of the free angles of the division, is but a very imperfect remedy for the inconvenience in question.

a. The process devised by Guillemeau, (*De la Nourrit. de l'Enfan*, chap. xxxvii., p. 438, in 8°) who had a special instrument for this purpose, or the method of M. Cloquet, (*Bull. de Fér.*, t. VIII., p. 206.) is infinitely less calculated to produce this difficulty. It consists in performing the operation at the lower part of the prepuce. The bistoury is to be directed upon one of the sides of the frenum, which itself is to be divided immediately afterwards, should it appear to be too much prolonged forward. Besides that there are fewer vessels in this direction than in the first, the wound in consequence of the retraction of its lips, becomes transversal only, and thus co-operates exclusively in continuity with the opening, which it was our intention to enlarge, without leaving, as in the preceding case, a deformity almost as embarrassing as the original disease. It would appear, moreover, that the ancients adopted the same course, for Celsus, in speaking of phymosis says, ". . . subter à summâ orâ cutis inciditur rectâ lineâ usque ad frenum, atque ita superius tergus relaxatum cedere retro potest." I have frequently used this

process, and everything induces me to believe that it will ultimately be substituted for the other.

*b.* The excision of the frenum by means of a V section from the prepuce, as proposed by *Taxil*, (*Arch. Gén. de Méd.*, 2e sér., t. XI., p. 230,) is referable to the same principle.

*c.* Instead of placing the incision upon the median line, either above or below, we are sometimes obliged by the presence of venereal ulcers or tubercles, to make it *on the side*, or even on both sides of the organ; but before this could be necessary, the prepuce must have been profoundly altered at the part which, under such circumstances would become the place of *necessity*, for these lateral divisions usually produce, whatever M. Malapert, who has endeavored to popularize this process says to the contrary, a very great degree of deformity.

*d. Process of M. Bégin.*—M. Bégin having grasped the prepuce with the forefinger and thumb of the left hand, makes, by introducing into this opening one of the branches of a scissors curved flat-wise, an oblique incision from the part nearest to the frenum to the middle of its dorsal surface; then bringing the instrument back to this point, he carries it as far as on the opposite side. The integuments being afterwards pushed back, the inner lining of the prepuce, which remains upon the glans penis, is incised upon the median line as far as to the fold which forms its base. If the preputial ring is too narrow to allow of the introduction of the scissors, M. Bégin, (*Elém. de Chir.*, 2nd edit., t. I., p. 550,) uses a bistoury surmounted with a ball of wax and lays open the prepuce from about the middle point of its length up to its free border. The two angles of the wound are then trimmed with the scissors, and the inner membrane is longitudinally incised in a third stage of the operation down to the base of the glans. No accident ensues from this operation and its result, according to the author, is to leave no deformity in the part.

*e.* In whatever way we proceed, it is possible and even very advantageous when the coarctation exists to a great degree, to plunge the point of the bistoury guided upon the sound through the skin, or from without inwards as is recommended by MM. Heurtaut (*Thèse de Paris*, 1811) and Tavernier, instead of making the puncture from the interior to the exterior. A good rule also, laid down by M. Tavernier, (*Bull. de Théráp.*, t. I., p. 147,) with the view of not deceiving ourselves in respect to the relative extent of the incision of the organic tissues, is the following: the sound being properly placed, its beak is to be moderately pushed forward; the surgeon then draws back the integuments until the rosy border of the mucous lining shows itself. The parts being held in this manner by an assistant or the surgeon himself, we shall be certain that the instrument perforating by a puncture either from the skin towards the sound or from the sound towards the skin, and brought forward from the root of the prepuce to its free border, will make a section as neat and as uniform as possible. [This process I have successfully followed in about 20 cases. T.]

*f.* As soon as the operation is terminated the cutaneous fold mounts upwards behind the gland. A plumasseau is applied upon the wound, which is to be surrounded with one fine and two long

compresses, or by a Maltese cross. To terminate the dressing, the extremity of the bandage is to be brought to the root of the penis, thence carried forward by circular turns to the anterior extremity of this organ and afterwards carried back again where it is to be finally attached. A suspensory previously applied, would enable us to keep up this small dressing much better still, and would render it less liable to be displaced. Finally it is advisable to make use of one or two turns of bandage or a cravat passed around the loins, by which means we are enabled to keep all the parts turned back in front of the pubes. The dressing is not to be renewed until the end of two or three days, unless it has become loose, and as soon as the solution of continuity begins to suppurate it is reduced, in fact, to so simple an affair that it is useless to speak of it more in detail.

g. In order that the wound may remain as narrow as possible in the antero-posterior direction, and that it may not be too long in closing, there will be an advantage especially to begin at the first dressing in placing the turns of the bandage upon the body of the penis, by proceeding from behind forwards, and then in making use, as M. Tavernier recommends, of a Maltese cross, having a hole in its middle portion, in order that it may leave the glans penis uncovered, while at the same time it pushes the divided prepuce from before backwards. The dressing being thus adjusted, is found to be more solid and all the tissues to be pushed against each other, in place of having a tendency to be separated apart, as frequently happens when we do not adopt this precaution. At a subsequent period I have found it advantageous to draw forward the callous border which the borders of the division will form for a considerable length of time, in order to make some compression upon it and to favor its resolution.

h. *Process of the Author.*—The following process has afforded me excellent results. I introduce three or four nooses of thread on each side of the frenum, at three lines apart from each other, and then immediately detach the frenum with a good pair of scissors. The point of a bistoury plunged in at the root of this wound on the median line, then lays open the prepuce, as in the process of M. Cloquet. Having divided the nooses of thread at their middle portion, I instantly knot them separately, and in this manner obtain the same number of points of suture, which immediately close up the two sides of the wound. In this manner there is no need of any dressing, and the cure may take place in three or four days.

## § II.—*Paraphymosis.*

A. If compresses wet with cold water, or containing ice, which possess the virtue, by diminishing the afflux of fluids, of reducing the size of the corpora cavernosa, of putting a term to the strangulation, and enabling us to bring the prepuce forward, should not be found to answer or cannot be employed, and should the inflammation or painful condition of the parts present in other respects no objections, we have still another resource to make trial of before proceeding to the operation, properly so called, which is used in paraphymosis.

B. This resource is *compression*. Some do this in the same way

as in applying a *roller bandage*, the pressure made by which is gradually augmented until the reduction of the glans penis can be effected; others make use of the *fingers*, and in such manner that in most cases we are enabled to relieve the patient immediately. The surgeon then grasps the penis with the fore and middle finger of each hand, crossing them behind the engorged border; his two thumbs remaining free, are to rest against the sides of the glans penis, in such manner that by acting in concert with the fingers, but in an inverse direction, they may crowd the glans backwards, while the prepuce is brought forcibly forwards as if for the purpose of covering the thumbs, which will then be found to be lodged in its interior. In order that the fingers may not slip upon the skin, it is advisable to separate them from it by means of a fine piece of linen, which has the advantage, also, of rendering the operation a little less painful. We should be wrong to reject this process merely because the disease has existed for 12 or 15 hours, and that the parts have already become inflamed and painful. I have made use of it in several instances with entire success at the expiration of 24 hours, or of 3 or 5 days without any inconveniences on that account, although the front part of the penis was extremely sensitive, and that there were many chinks upon the sides of the preputial border. It is an operation calculated to succeed in the majority of cases if it is well performed, and the steps of which it is unnecessary to point out more in detail to those persons who are sufficiently well instructed to know how to execute it in the manner required.

C. In case however it should not answer the expectations of the surgeon, and that circular compression should not be practicable, we should proceed then to the *cutting instrument*.

I. While an assistant stretches the penis at its two extremities and gives a moderate curvature to its lower side, the operator glides a *narrow bistoury* flatwise between the dorsal surface of the glans penis or corpora cavernosa, and its envelopes as far as to the point of strangulation, then turns the edge of the instrument upwards towards the skin, if he is certain of having penetrated underneath the constriction, or in the contrary case, towards the side of the penis, and then immediately makes the incision, depressing the wrist in the first case, and raising it a little in the second. If a first incision should not appear to answer, we immediately make one or two more in the same manner.

II. *Processes of the author.*—In place of digging away in this manner in the tissues in order to reach down to the bridle, and instead of first incising the skin posteriorly, and inserting through that opening a grooved director to guide the bistoury under the strangulation, as recommended by Richter, would it not be better to make the incision directly on its external surface? I know of no circumstances scarcely which could render an incision of this kind wholly impracticable. By causing the skin to be drawn back towards the pubis, while an assistant endeavors to reverse the diseased border in front we generally succeed in exposing to view the base of the circle which causes the accident. Nothing is then easier than to direct perpendicularly upon this border the point of a straight bistoury held as a writing pen, and to make on one or several points, by means of

this instrument, small incisions which we may carry to any depth required without incurring the risk of making any mistake as in the other method. I give the preference to this process, and I have found it to succeed so well, even on a very young child, in whom the paraphymosis had existed for the space of three days, and upon all those adults in whom I could not reduce the glans penis by means of the fingers and thumbs, that I can scarcely conceive any circumstances in which the ordinary process would be considered indispensable. If a straight cataract needle, or my ophthalmoxist, or the small tenotome of M. Bouvier, were glided from before backwards under the prepuce, or inserted by puncture under the bridle from behind forwards, they would render the operation still more simple and certain, and less painful. A small quantity of lint besmeared with cerate, lotions of marshmallow water, topical emollients, and the most simple containing means, are the only auxiliary treatment subsequently required by this small operation, which could not be attended with any inconvenience unless we had wounded the corpora cavernosa by largely laying open their fibrous envelope, or had divided the principal arteries of the penis; these accidents, however, would appear to be of very little importance.

### § III.—*Strangulation of the Penis.*

Since Morand drew attention to this subject, all practitioners have related cases of individuals who mechanically, and from depravity, or inadvertence, have got their penis incarcerated in certain cords or rings from which they could not afterwards withdraw it. This sometimes has been produced by a circle or ring of iron, copper, silver, gold, or any metallic cylinder whatever; at other times merely by a packthread or common thread, &c., or by the socket of a candlestick, as has been seen by Dupuytren. Sometimes, finally, it has been effected by means of a steel ellipse, known under the name of briquet, which persons have imprudently placed around their penis, occasionally embracing with it even the scrotum also. The parts soon react upon such obstructions, which latter subsequently become concealed at the bottom of a groove of more or less depth, and consequently by the swelling which they occasion speedily bring about a perforation of the urethra, or of the fibrous envelope of the corpora cavernosa, even if they should not go to the extent of producing a gangrene of these parts. Bands of thread, cord, or ribbon, will never produce any serious embarrassment to a surgeon; the point of a bistoury or a sharp-pointed scissors, will always promptly divide them, without any great difficulty. The same remark nearly, would apply to a circle of willow, bulrush, or wood. To divide a ring of ebony, ivory, or horn, it would become necessary to use a very strong pair of scissors, or cutting pliers; while for metallic bodies, the file or saw would frequently become indispensable. In such cases, a cutting diamond would be a valuable resource if it could be commanded. Unless it should have a great degree of thickness, the hardest circle would probably yield to the application of two small hand-vices if it were practicable to grasp it. Should there be too great a degree of engorgement, this is to be in the first place diminished by means of

bird-peck punctures and scarifications. Afterwards, the edges of the groove are to be separated as much as possible, in order to insert when it can be done, a piece of wood, metal or linen, under the constricting body, to protect the parts against the action of the instruments. Moreover, the saw and file should be directed almost transversely to the penis, much more than in the direction of its length, while the employment of the other means will be sufficiently understood in themselves without the necessity of entering into further details. A boy 7 years of age, in order to prevent his any more wetting his bed, undertook to tie the middle of his penis with a thread. The mother, who did not find it out until the 7th day, brought him to consult me at the Hospital. The skin cut through by the thread, had cicatrized over it, and the ligature was no longer visible except by the extremities of its knot. After having divided it, I effected its extraction and on the following day no further difficulties remained. The urethra had not been divided.

#### § IV.—*Division of the Frenum.*

The frenum of the penis, like that of the tongue, is sometimes a good deal too much prolonged in front. From whence it results that in certain persons, the penis during erection is obliged to become curved downwards in such manner as to render copulation painful, and ejaculation difficult. The remedy for this peculiarity is so easy of application that any person may use it. In the first place, the abnormal fold frequently tears of itself during the efforts of coition; if it resists this, it is to be divided by the scissors or bistoury. The glans penis being properly raised up by an assistant or the patient, the surgeon has nothing more to do than to draw the prepuce downwards, and if he uses the scissors, to divide the bridle from before backwards, and as much of it as possible with a single cut. If the bistoury is preferred, it is a matter of indifference almost whether we transfix the frenum at its base to divide it from behind forwards, or merely incise it from the free border to its adhesions. In every case, we should while separating it, graze the glans penis, in order that no rugosity may remain on this part after the cure. Its destruction by means of caustics, nitrate of silver, &c., formerly employed, and even still at the present day by some persons, would not be made use of unless the patient had too great a dread of the cutting instrument. Though it may be scarcely necessary to employ any dressing whatever, we should, if the individual were very irritable, or too timid, cover this small wound with linen besmeared with cerate, and then with lint over this. We must take care, moreover, not to leave the prepuce too long a time in the same place, provided it continues to cover the glans. Otherwise the parts might become agglutinated together, and the operation prove a failure.

#### § V.—*Adhesion of the prepuce to the glans penis.*

The inner surface of the prepuce sometimes adheres very closely to the glans. When this infirmity is not accompanied with coarctation, it does not in general involve any particular inconve-

nience, so that it would be imprudent to attempt to remove it by means of an operation. Nevertheless, if as in instances that have been related, it should render coition impossible, and the person should wish at any hazard to attempt its cure, the following is the mode in which we should proceed. After having detached the prepuce below to a sufficient extent to allow of its longitudinal division, the surgeon should dissect it little by little around its whole circumference, as far as to the union of the glans with the body of the penis. To prevent the parts from coming again in contact and reagglutinating as before, it would be necessary to keep the skin drawn back towards the pubis, and the wound covered with a perforated linen spread with cerate, and supported by lint, a compress, and a bandage; finally, all the proper means should be had recourse to, to compel the bleeding surfaces to cicatrize separately. J. L. Petit has justly remarked that the destruction of these adhesions is neither an easy matter, or unattended with pain. Unless they should be complicated with phymosis, it would even be better perhaps where they include the whole circumference of the glans penis, not to meddle with them. When, on the contrary, they make only a simple bridle, or occupy only one of the regions of the organ, the deviation which they cause in the penis during erection, and the greater facility with which we may destroy them, authorize us in not respecting them. M. Laugier, (*Arch. Gén. de Méd.*, t. XXVII., p. 5,) has shown that in children, where from the phymosis they cannot be generally recognized, or where at least we cannot ascertain their character, amputation of the prepuce or circumcision is the most rational course to be adopted, provided, however, that the greater portion of the glans penis would be enabled to continue uncovered after this excision.

#### § VI.—*Destruction of the Prepuce.*

The prepuce in place of being too long and adherent to the glans, may be too short. Celsus, who had already devised a mode of destroying this defect of conformation, advises that we should make on the body of the penis a circular division of the skin at a certain distance from the glans, then to draw the integuments forwards and fix them by means of threads beyond the free extremity of the organ. At the present day we know, and can no longer doubt, that an operation of this kind is unnecessary, and that the cicatrix scarcely ever fails to draw the skin gradually backwards again, and thus re-establish the defect in its original condition; but it is probable that we should succeed better by detaching the anterior portion of the penis, from its envelopes to the extent of one or two inches, in such manner, as to be enabled to bring them as far as to the front of the meatus urinarius, under the form of an artificial sheath. Only we should then have to adopt precautions to prevent the adhesions of this new encasement from being prolonged too far upon the body of the glans penis itself. If the prepuce had lost only a small quantity of its periphery, and it should be found impossible to remove this notch in proceeding in the manner of harelip, we should have to dissect to a greater or less extent the two sides of the division, in or-

der afterwards, when we had abraded its edges, to approximate and unite them by suture. In conclusion, it is evident that *posdeplasty* would present in fact as many modifications as cheiloplasty. M. Dieffenbach, moreover, has shown that Sabatier as well as J. L. Petit, were under an error in proscribing as impracticable those different species of restorations applicable to the virile member. (See *Anaplasty*, Vol. I.)

### § VII.—*Amputation of the Penis.*

A. From the *mobility* and the extreme distensibility of the envelopes of the penis, it will happen that tumors of the prepuce for example, will gradually push back the glans and corpora cavernosa in such manner as to appear to occupy the place of the body of the penis itself, when, in fact, there are no other than its coverings that are affected; from this, without doubt, originated the error of certain ancient authors, who imagined that the penis was capable of being reproduced, and that it has been seen to grow again, after having been amputated. We may, in fact, remove a very considerable extent of parts and nevertheless not reach as far back as the meatus urinarius. The tissues which have been in this manner crowded forward by the tumor or the swelling, are elongated in such cases to so great an extent as to impose readily upon those who are already predisposed to error. Cancer is not the only malady which may cause this illusion, for all other kinds of degenerescences are calculated to produce the same effect. Even acute inflammations have sometimes given rise to this deception. In 1824 there was admitted into the hospital of Perfectionnement, a robust man about forty years of age, in whom the penis, which was enormously swollen, became gangrenous, in twenty-four hours, down to two inches from its root. Precautions were adopted to save what might remain of the glans or of the corpora cavernosa in the midst of this putrilage, but they were found, intact, behind the sphacelus, and were without any lesion except some slight excoriations on their front part.

B. Amputation of the penis may be either *partial* or *total*; partial whenever the cancer does not occupy its entire substance, and in the contrary case total. Those descriptions of cancer of the penis which commence on the skin, either at the prepuce or elsewhere, do not in general reach to its fibrous envelope or spongy tissue until after the lapse of a very long period of time; we should therefore commence their extirpation in the same way as if to preserve the principal organ, but so as to keep in view nevertheless our power to sacrifice it when it shall be found to be actually altered. The precept of *removing only the degenerated tissues*, one which so many ancient authors insisted upon, and to which Callisen so frequently reverts when speaking of operations to be performed on the genital organs, has been too frequently overlooked. The suggestion also made by M. Earle, (Pl. Portal, *Clin. Chir.*, t. I., p. 57, 1836,) that we should remove only the cutaneous or superficial layers when the cancer of the penis does not appear to have involved the cavernous tissue, deserves to be adopted. We should rigorously adhere to it therefore especially in cases where, like that related by M. Gendrin,

there was a well-defined hematic tumor, or one that was sebaceous or lipomatous, or any whatever that was cutaneous or sub-cutaneous, as has frequently occurred to me in my practice.

C. Besides the peculiarities connected with the envelopes of the virile member, amputation of this organ requires that we should not lose sight of the arrangement of its own appropriate elements. The fibrous encasement which forms its covering, and the spongy tissue whose meshes all communicate with each other, cause it to be elongated or shortened immediately after the operation, according as the tumor should have previously crowded it back or drawn it forward. The cavernous arteries enclosed in its interior, one on each side, being but slightly adherent, protrude at the surface of the wound if the stump has retracted to a considerable degree; on the contrary they will appear to be embedded in its tissues if it has undergone an elongation. The urethra being applied against its lower surface and also in immediate contact with the skin, presents moreover this remarkable peculiarity, that its free wall attaches itself with great facility to that which is adherent; so that it almost always conceals itself at the circumference of the wound immediately after the amputation. The *osseous septum* noticed between the corpora cavernosa by M. McLelland, (*The Lancet*, vol. I., p. 714, 1828; *Arch. Gén. de Méd.*, t. XVII., p. 272; *Journ. des Prog.*, t. IX., p. 243,) could not have been extirpated without compromising the life of the patient or the functions of the penis. I refused to operate in any manner whatever in a patient who had this singular deformity, and in another in whom an osseous prolongation, fifteen lines long, was sent out from the pubis on the left side of the penis.

I. *Ligature*.—The fear of hemorrhage induced some ancient authors not to make use of the cutting instrument to amputate the penis, which they thought it more advisable to strangulate by means of a ligature. Ruysch cites a successful result obtained by him in this manner. Nor have Heister, Bertrandi, M. Graefe (Michaelis, *Bull. de Fér.*, t. XX., p. 210) and M. Binet (*Revue Méd.*, 1828, t. III., p. 70) thought this method unworthy of employment. To perform it we should at least previously introduce into the bladder a catheter to prevent the ligature from closing up the urethra. If we should have any apprehension of causing too much pain by applying the ligature immediately upon the skin, nothing would prevent our adopting the recommendation which we still find in Sabatier, to incise the tegumentary covering circularly before applying the thread; but this incision, which is as painful as amputation, properly so called, is precisely that which deters certain timid patients from undergoing excision, and which induces them to prefer strangulation.

II. *Ablation*.—The patient is to be placed in a horizontal position. An assistant grasps the root of the organ and draws back the skin to a greater or less extent towards the pubis, according as the disease appears to have drawn it more or less forwards. The surgeon immediately seizes the tumor, which has been wrapped in linen, and holds it firmly with his left hand; with a bistoury or small knife in his right hand he then divides with one cut the body of the penis a little beyond the limits of the disease, and perpendicularly and either from above downwards or from below upwards. A previous divis-

ion of the skin a little in advance of the place where the corpora cavernosa are to be divided, would add but little to the length of the operation and would always enable us to adjust the section of the penis exactly upon a line with the retracted integuments. This process, therefore, which Boyer recommends, when the disease extends nearly as far as the scrotum, appears to me to deserve the preference in all cases. The arteries which are to be closed up are sometimes six in number or even seven, viz., two dorsal, two cavernous, the extremity of the two superficial arteries of the perineum below, and also those of the septum on the lower median line. The four principal ones, however, are the dorsal and the cavernous arteries. The very loose tissue which encloses the first would render their isolation and torsion an easy matter, should a ligature upon them be attended with the slightest inconvenience. The same remark nearly would apply to the second named arteries; but as we are not to attempt immediate reunion in a wound of this description, it is a matter of very little importance that the vessels should be twisted rather than tied.

III. *Process of Barthélemy.*—Before proceeding to the dressing, a catheter must be introduced into the urethra. Some persons having alleged that it would be difficult in some cases to find again the orifice of this canal at the bottom of the wound, a military surgeon, M. Barthélemy, (*Journ. Hebdom.*, t. XIII., p. 41.) has proposed that we should insert the sound before commencing the operation, and to cut through it at the same time with the penis, in order that it might be thus found placed in a natural position by the same stroke. This is a modification which may be adopted or rejected almost indifferently, did it not incur the risk of the posterior portion of the tube escaping into the bladder, or if the section of this instrument did not render that of the remainder of the penis somewhat more difficult. To a person possessed of any anatomical knowledge, the finding of the urethra, notwithstanding what M. Barthélemy may say, would never be a circumstance of any great difficulty. Béclard of Strasbourg, and MM. Poirson and Bedor, however, have made trial of this process with success.

IV. The method of M. Schroeger, (Rust's *Handb. der Chir.*, vol. I., p. 667,) which consists in dividing the penis, layer by layer, from above downwards, in order to tie the vessels in proportion as they are cut, is of no value. The noose of thread passed through the corpora cavernosa to prevent their retraction and tie the vessels without danger, as recommended by M. Langenbeck, (*Ibid.*,) would only be useful in cases where, as in that of M. Hall, (*Gaz. Méd.*, 1836, p. 748,) we were obliged to carry the bistoury as far down as under the pubis.

V. If the skin should have been crowded back too far, it would of itself spontaneously cover over the wound, and might in this manner produce some trouble. When, on the contrary, it has not been crowded back sufficiently, it is seen to retract towards the pubis, thus leaving bare the fibrous envelope of the corpora cavernosa. As there is no remedy to this last inconvenience, and as in the other method we always have it in our power to excise the superfluous portion of integuments, it is in fact better to draw back the tissues

towards the mons veneris, while we are amputating the penis. Nor would there still, though we were obliged to operate near the pelvis, be any argument for giving the preference to the ligature over excision. The vessels at this place cannot present any great degree of embarrassment; cauterization, moreover, with the red hot iron, or caustics, recommended as a general remedy by so many authors, would constitute a last resource, which would be found sufficient to put an end to the hemorrhage. Compelled by a return of the disease to repeat the operation three times, M. Hall, who went as far as to the pelvis, nevertheless effected the cure of his patient. But what shall we say to M. Ogier, (*Gaz. Méd.*, 1836, p. 748,) who states that though he amputated the middle of the body of the penis, he nevertheless reagglutinated and preserved the glans!

VI. *Dressing.*—After the catheter is once fixed in the urethra, all that we have to do is to apply a Maltese cross perforated by this catheter, over the wound. Plumasseaux, two long compresses, and a narrow bandage, which supports them on the remainder of the penis, and afterwards passes once or twice around the pelvis, constitute all the pieces of the dressing, unless we should prefer, as after the operation of phymosis, the employment of a suspensory or T bandage, upon which should be fastened the small bandage or the extremity of the two long compresses which have been crossed over the bleeding surface. As the catheter in these cases has no other object than that of allowing the urine to escape without touching the wound, and that of preventing the closing up of the urethra, we may object to its use from the fact that the passage of the urine over the wound, far from being injurious, is sometimes advantageous. The proof of this lies in the fact that in former times the urine was frequently employed to favor the cure of wounds.

VII. It is the opinion of some persons that the urine expelled from the bladder would serve as a sufficient obstacle to the obliteration of the meatus, and moreover from the urethra being lined by a mucous membrane, that there could be little reasonable apprehension of its obliteration. I saw in 1823 a fact calculated to confirm this opinion. An old man had the penis amputated by M. Bougon for a cancer; the catheter was placed and the dressing applied according to the usual rules. But this man, destitute of every faculty of reason, was unwilling at any hazard whatever to sustain the slightest dressing. On the second day, he removed the catheter and the rest of the dressing. I reapplied them several times, and was never enabled to induce him to keep them on. Finally, it was given up, not however without serious apprehensions of the danger that might result from this omission. The wound however cicatrized regularly, and the urethra preserved as good dimensions as could be desired.

VIII. *A catheter therefore is not indispensable.*—As its presence therefore is not unattended with inconvenience, we might, if we did not wish to dispense with it entirely, make use of it, at least only during the first days, in order to prevent immediate reunion, and at the termination of the treatment as recommended by Le Dran for the purpose of preventing secondary coarctation. We might, moreover, wholly dispense with it by adopting the precaution of uniting the mucous membrane of the urethra to the skin by means

of three points of suture, according to the process which I have pointed out in speaking of cancer of the lips, and which, according to M. Rorbye, (*communicated by the author, 1838.*) he has heard recommended in Germany.

IX. I cannot terminate without remarking that amputation of the penis, simple as it appears to be, rarely fails, notwithstanding, to be followed by consequences of quite a serious character. Though patients who undergo this operation almost constantly recover at the expiration of fifteen, twenty, or thirty days, a considerable portion of them soon become a prey to the most melancholy reflections, and to a deep-seated depression of mind that nothing can remove; to such degree that some ultimately destroy themselves, while others, in a number of instances, succumb to their mental despondency at the very moment when it was least suspected. If the *glans penis alone is removed*, it is shown by a fact in Scultetus, and another of M. Buret, that sterility is not the inevitable consequence. In every other case could the result be other than this?

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## CHAPTER II.

### THE SEXUAL ORGANS IN WOMAN.

As abscesses, schirri, loupes, tumors, and cysts of every description, and also varices noticed in the labia majora, are to be treated and operated upon in the same manner, and after the same rules, as in any other region of the body, they scarcely require, in this place, any particular description. Amputation of the clitoris and exsection of the nymphæ are too seldom required, and of too little importance, to make it necessary to enter into a detailed separate description of them. I shall say therefore only a few words concerning them.

#### ARTICLE I.—TUMORS OF THE VULVA.

Almost all those tumors which are noticed at the vulva, belong to the labia majora, labia minora, or clitoris.

##### § I.—*Labia Majora and Mons Veneris.*

A. *Abscesses* are frequently developed with great rapidity in the tissues of the labia majora. Their characters consist in making their appearance rather posteriorly than in front, of becoming filled with a pus which readily acquires an infected odor and dark colored tint, of being frequently produced, as M. Vidal shows, by small ulcerations in the vagina, and of easily taking on afterwards a fistulous condition when they have been evacuated. I shall recur to this subject under this point of view when treating of fistulas at the margin of the anus in women; I will merely remark here that these abscesses should be early and freely opened, on the cutaneous rather than on

the mucous portion of the labia majora, and in the direction of the perineum rather than in that of the mons veneris.

B. *Hematic tumors* and sanguineous cysts are also frequently developed in the tissues of the same organs, either in consequence of falls, blows, or accidental external violence, or from frictions made during coition or from the effects of pregnancy, or parturition. Having elsewhere treated, (*Art des Accouch.*, t. II., 1835,) of these tumors under the title of thrombus of the vulva, and having related there the principal examples of this kind which science possesses, to which might be added the six instances related by MM. Riecke and Elsasser, (*Arch. Gén. de Méd.*, 2e ser., t. V., p. 608,) I will not dwell again upon their history in this place. Their treatment, moreover, is the same as that for hematic tumors in general, and it is only in their connections with pregnancy or parturition that they could present any peculiar features.

C. *Sero-mucous Cysts*.—There exist in scientific collections, and there are still daily seen in practice, numerous examples of sero-mucous cysts developed in the tissues of the labia majora. These tumors, whose existence has been pointed out by Pottier, (Bonet, *Corps de Méd.*, t. IV., p. 492,) Mauriceau, (*Mal. des Femmes Enceintes*, p. 152,) Denman, Watson, and Davison, (Denman, *Traité des Accouch.*, t. I., p. 168,) which I myself have seen in a great number of instances, and which rarely exceed the size of the fist or a pullet's egg, usually contain a glairy, mucilaginous, and synovial, or purely serous matter. I have already said that they appear to me to have been often confounded under the name of hydrocele, with infra-pubic serous tumors in women. I will add that in most cases we may trace their origin to some ancient injury to the part, or to the consequences of an infiltration or effusion of blood. It would appear also that a predisposing cause to these tumors is found in the species of bursa-mucosa which frequently exists in the centre of each labium majus. Puncture and iodine injections, when they are of large size and tense, are the best means to apply to them. In the contrary case, it is better to lay them open largely or excise their free portion to induce the sac to suppurate, than to treat them by simple incision. It would be advisable, moreover, to have recourse to the same means that I have mentioned under the article of sero-mucous cysts in general.

D. The *mons veneris* is liable, like all other regions of the body in women, to the development of various descriptions of tumors. M. Faneau (*Précis Méd. d'Indre et Loire*, &c., 1821,) has met here with a fibrous mass of the size of the head, and which he successfully extirpated. I have in two instances seen here an enormous varicose mass which ascended up as high as the umbilicus; I have no need of remarking that abscesses, thrombi and sanguineous tumors are also very frequently met with in this region. Operative surgery, moreover, possesses no peculiar resources which can be enumerated with any advantage, in treating of these tumors.

E. The vulva, which is naturally supplied with numerous vessels, and whose lips, in old women especially, are transformed sometimes into large varicose or *erectile tumors*, is also liable to all the varieties of sanguineous fungous tumors from the tenderest age of childhood. In a little girl, three years of age, I found the middle third of the left

labium majus occupied by an accurately defined arterial erectile tumor, which might have been extirpated without any danger. An erectile tumor which was situated upon the left labium majus of a woman 29 years of age, was successfully extirpated by M. Portal, (*Clin. Chir. &c.*, p. 142.) It is readily understood, moreover, that what has been said of erectile tumors in general, (see Vol. II.,) must be applicable in every respect to erectile tumors of the vulva in particular.

[*An Encysted Tumor* in the left labium majus, of the size of a goose-egg, and which led to the supposition of a hernia, from its disappearing on pressure, was removed by Mr. Syme, (Cormack's *Journal*, Feb., 1846, pp. 83, 84,) from a woman aged 35, by a cautious dissection of the sac, and especially its posterior adhesions. The woman speedily recovered. Mr. Syme had never before met with an *encysted* tumor in the labium, but has removed one of the size of a pigeon's egg from the prepuce of the clitoris. T.]

### § II.—*Tumors of the Clitoris.*

The clitoris, which is a sort of rudimentary penis, is susceptible of all kinds of degenerations. The ancients, who frequently amputated it, had scarcely any other object in view in these cases, than to moderate the too great degree of lasciviousness in women. Perhaps excision of the clitoris considered in this point of view, has been too positively rejected for more than a century past. Certain it is, that a young girl, reduced to marasmus by masturbation, was radically cured of her vicious propensities, after M. Robert (communicated by the author, 1839,) had amputated her clitoris. The operation then would be so simple, and so entirely exempt from dangers, that we should, I think, decide upon it without hesitation. The clitoris, moreover, has been frequently amputated for large sized tumors. Welschius (Bonet, t. III., p. 309—t. IV., p. 309,) says that Molinetti extirpated one weighing 9 pounds. Rougemont (*Bibl. Chir. du Nord*, t. I., p. 132,) quotes from Kremer an instance of a clitoris of the size of three fingers, and which had become transformed into a sort of cauliflower, and was amputated with success. In a woman, who had menstruated by the urethra, the clitoris, which had grown into an enormous tumor, was also successfully amputated by M. E. Coste, (*Journ. des Conn. Med.*, t. III., pp. 205 and 276.) M. Syme, (*Edinb. Surg. and Med. Journ.*, vol. 137, p. 387,) who states that he had occasion to excise a tumor of the clitoris, in a girl 8 years of age, was also placed under the necessity of extirpating a large cyst, developed in the same organ in an adult woman. But the most curious case of this kind is, that described and figured by M. Schoenfeld, (*Encyclog. des Sc. Méd.*, 1837, p. 188.) The tumor, which included also the nymphæ, and presented a granular aspect, weighed 3 ounces. The extirpation, which in other respects was easy, occasioned a hemorrhage, which was arrested by cauterization, and the patient was soon restored. A case nearly similar had been already related by M. MacFarlan, (*Arch. Gén. de Méd.*, 2d ser., t. II., p. 281.) What I have already said of processes relating to the amputation of the penis, might be repeated under the head of tumors of the clitoris. The

operation, nevertheless, whatever may be its modification, is still more easy here, and less dangerous than at the penis. As there is no large sized artery in the pedicle of the organ, and no urethra to be respected, I see no reason which could induce us to make use of the ligature rather than the cutting instrument. By means of the bistoury the tumor may be removed in a second of time, and should a hemorrhage supervene, it could be soon put a stop to by the ligature, compression or caustics. Caustics would not be admissible in tumors of the clitoris, except for those degenerescences which were flattened, diffused, and destitute of a pedicle, or in such patients as persisted in refusing every other kind of medical resource. The ligature in its turn would not be applicable except in timid persons, or in cases of tumors with a slender pedicle, or where we had reason to apprehend the existence of numerous large sized vessels in the root of the clitoris itself.

### § III.—*Tumors of the Nymphæ, or Labia Minora.*

Excision of the nymphæ, which was formerly so frequently had recourse to, is scarcely ever practised at the present day. As these folds do not acquire large dimensions in our climate except in rare instances, they do not excite the attention of women unless they actually become diseased. Whether the pretended apron of the Hottentots be nothing more, as M. Larrey maintains (*Clin. Chir.*, t. III., p. 87,) than an elephantine degenerescence of the labia minora, or whether it belongs to another order of hypertrophy or degenerescence, certain it is, that the wife of a Fellah, whom our celebrated military surgeon saw at Cairo, had on the labia minora an elephantine tumor in every respect analogous to that which is seen in the scrotum. In the women mentioned by Kramer and M. MacFarlan, one of the labia minora, or both, had acquired a considerable volume at the same time that there existed as extraordinary a development of the clitoris. M. Priefer, (*Journ. des Conn. Méd.*, t. I., p. 90,) who has seen the nymphæ acquire an enormous volume, applied the ligature to them on both sides. One of the tumors became detached on the 8th day, and the other on the 10th. There supervened an inflammation, accompanied with delirium, which was met by the antiphlogistic treatment, and which did not prevent the radical cure of the patient. Should the nymphæ be merely hypertrophied, the way would be to excise them either with the bistoury or with a good pair of curved scissors. A sufficient number of threads previously passed through their root, would enable us after the excision to unite the two borders of the wound by first intention, by means of the suture, and in this manner to cure the patient operated upon in the space of a week. The same process would be still applicable, however extensive or of whatever nature the tumor might be, provided the latter comprised the whole length of the fold, without having its root too much widened. Otherwise it would be advisable to divide its pedicle after it had been properly isolated, or in other cases to dissect it carefully, and that according to the rules laid down in the article on *Fibrous Tumors in general*, or on *Elephantiasis of the Scrotum.*

#### § IV.—*Elephantiasis of the Vulva.*

Fibro-cutaneous, or elephantine tumors of the vulva, appear to be quite common. To the instance cited by M. Larrey, we may add at the present day, that of M. Gilbert, as related by M. Allard. In this case, the tumor, which was of the size of an ostrich egg, was situated on the right labium majus. Another case has been related by M. Talrich, (Delpech, *Clin. Chir.*, t. I.) In this the tumor was 14 inches long, and a foot and a half in circumference, and its extirpation was performed with entire success. M. Clot (*Journ. Hebd.*, 1835, t. II., p. 298,) has extirpated another of the size of the head of a newborn infant, with the same successful result; but a woman who had one of similar dimensions removed by M. Green, (*Medical Journ. of Sciences*, 1835,—*Gaz. Méd.*, 1836, p. 570,) died a short time after the operation. But the most remarkable instance of this kind of production, is that related by M. Rapatel, (*Journ. des Conn. Méd.*, t. III., p. 230.) This tumor, which was extirpated successfully by this surgeon, weighed 17 pounds. M. Monod, whom I assisted in the operation, removed one of the size of the head of an adult in a woman 20 years of age, who had experienced no pain from it, and who soon recovered. I have myself amputated tumors of this description in four instances, but they were of far less volume. All of them were pediculated and pyriform. One was of the size of an ostrich egg, two that of a pullet's egg, and the fourth, which had a thin and very long pedicle, was scarcely larger than a nut. The one I removed in a patient of M. Layraud, was on the inner side of the labium majus. That of a woman in the Place Maubert, was situated on the outer side of the fold. In a patient whom I operated upon at the Hospital of La Charité, its root was imbedded in the groove which separates the labium majus from the breech. In a fourth case, it appeared to have been entirely produced by the posterior extremity of the right fold of the vulva. In all these cases the operation was extremely simple, as nothing more was required than to hold the tumor with one hand, while with one cut of the scissors or bistoury, I divided its pedicle with the other. It rarely happened that there were any more than a few drops of blood, or that the patient was even conscious of the operation. For large sized elephantine tumors, there would be no other rules to be observed in the operation than those which are laid down in the chapter on tumors in general. It would be necessary only that we should make ourselves assured before extirpating them, that there was no vulval hernia, nor any viscus which had protruded into the tumor through the openings of the pelvis. A woman, different from what exists in man, having no important part of the genital organs externally, is placed under such anatomical conditions that we may dissect and boldly remove with free cuts of the instrument, every description of tumor which is found at the vulva, or in the neighborhood of this region.

#### § V.—*Tumors of the Vaginal Septa.*

The walls of the vagina are also quite frequently the seat of various tumors, which are seen sometimes in the interior of the canal

itself, and at other times have their root in the tissues of the organic layers of which it is composed, or upon its external surface. Thus there have been noticed in the vagina sanguineous collections, abscesses, cysts of every description, and schirrous and encephaloid tumors.

A. One of those that have been most anciently known was noticed by Pelletan; it was situated in the left wall of the vagina. Dupuytren (Lemazurier, *Gaz. Méd.*, 1835, p. 544,) supposed it a hernia, but Pelletan, (*Arch. Gén. de Méd.*, t. XVII., p. 300,) by laying it open freely, demonstrated that it was a cyst. M. Roux met with one which projected at the same time into the rectum and vagina. Although it was of considerable size he extirpated it and cured his patient. In another woman, attended by M. Récamier, (*Lancette Franç.*, t. V., p. 92,) who had a tumor between the rectum and upper part of the vagina, it made its way into and was evacuated through this last canal. The case, according to every appearance, was one of an hematic collection. We are indebted to M. Voilot (*Gaz. Méd.*, 1835, p. 702,) for the history of a very large sized tumor, which was situated on the anterior wall of the vagina or under the urethra, and which concealed the clitoris, and contained a milky liquid, while at the same time there was another tumor situated lower down, and which was filled with a dark colored matter. They were successfully excised, and it would seem, also, that these were cases of a degenerate hematic deposit. A concrete tumor which was situated in the vesico-vaginal septum, was successfully extirpated by M. A. Bérard, (*Ibid.*, p. 384.) The one treated by M. Lisfranc (*Ibid.*,—Sonier Moret, *Arch.*, 2e sér., t. VII., p. 243,) was situated in the recto-vaginal septum, to which it was adherent only by a pedicle. Moreover, it must be that this surgeon operated upon two cases, for the patient mentioned in the Gazette was cured, while that cited by M. Moret died in consequence of the operation. A tumor of the size of a small egg, which was situated in the vesico-vaginal septum, and which M. Sanson (*Ibid.*, p. 543,) removed, was also a cyst of an hematic character. I operated myself in 1833, at the hospital of La Pitié, on a woman who had an encephaloid tumor of the size of a small egg about the middle of the recto-vaginal septum, and I saw in 1838, at the hospital of La Charité, another woman who had one of the size of the fist in the same place, or a little nearer to the vulva. I do not speak here of *syphilitic vegetations*, which are so frequently seen at the entrance of the vagina, nor of hernias either of the perineum or of the labia majora; but I ought to mention that tumors proceeding from the abdomen or pelvis, sometimes become lodged to a considerable depth in the recto-uterine cul de sac, so as to make a marked prominence upon the interior of the vagina. I have noticed there a number of times the apex of purulent and sanguineous collections, that of serous cysts and of cysts of the ovary and of fecundation, as I have also seen there fibrous tumors or the fundus of the uterus itself distended and reversed.

B. All these tumors which I have just spoken of, may lead to embarrassment in respect to their diagnosis; before attacking them with a cutting instrument, however, it is a matter of the greatest importance to ascertain if they are altogether local, or if they do not

communicate in some way or another with the interior of the peritoneal cavity or rectum posteriorly, or with the bladder or urethra in front. It is readily understood, in fact, that if the source of the disease was either an intestinal hernia or that of any other viscous, or an ulceration or perforation either of the urinary passages or of the peritoneum or intestine, the operation to be performed would be very different from that for a tumor purely vaginal. All that is necessary, however, to enable us to avoid any error, and to apply to each disease the operation most suitable to it, is to be apprised beforehand of the various lesions which may take place in that region.

I. In cases of cysts, whether serous, purulent, or hematic, the operation is easy and attended with but little danger. The process most advisable to follow is that of excision. Having secured the tumor by means of an erigene, we extirpate all its projecting portion either by means of the bistoury or a good pair of scissors. Injections which are at first emollient, then detergent, and afterwards resolvent, will be found sufficient to effect the cleansing and cicatrization of the surface. It rarely becomes necessary to cauterize or to undertake to extirpate the adherent wall of the cyst, which it is better to leave in its place, and which ultimately becomes a part of the corresponding wall of the organ.

II. Should the tumor be very large and greatly attenuated, or the matter contained in it consist of serosity or fluid blood, we might puncture it, throw up an iodine injection, and treat it in every respect like a hydrocele. Should it on the contrary be small, with thick or well nourished walls, we might undertake its cure by a simple incision, and treat it as an ordinary abscess.

III. When the cases under consideration are those of abscesses and cysts developed and established in the recto-vaginal cavity, we must not forget that arterial branches of considerable size may possibly be found there, and that by plunging in the bistoury in this part, we moreover necessarily divide the peritoneum. I have, however, by plunging a straight bistoury into this cul de sac, cured a lady of an enormous sanguineous collection, and also a number of other patients, who afterwards discharged a considerable quantity of pus through this passage. I ought to add, however, that in performing the same operation for extra-uterine productions in two different cases, it did not succeed. I have moreover, in another work, treated in detail of this division of the subject. (*Art des Accouch.*, t. I., 1835, et *Dict. de Méd.*, art. *Grossesse extra-uterine*, 2d edit.)

C. In respect to solid tumors, I have in several instances met with those which might have been extracted through the upper part of the vagina. I have even been on the point of undertaking that operation which has, I believe, been performed in one or two instances in France; but I was ultimately dissuaded from it by the age of the patient and the size of the tumor.

I. In the walls of the vagina itself, concrete tumors should be extirpated entire when we have decided upon operating upon them. As they are situated upon thin irregular septa, their dissection would be so much the more delicate, inasmuch as we should incur the risk, should we penetrate into the bladder or rectum, of leaving disgusting fistulas, which would be found very difficult to cure, at the same

time that we should be liable, higher up, to perforate the peritoneum, which would also be attended with its dangers. We should therefore be careful to protect ourselves by the necessary precautions.

A. In operating on the *posterior wall*, the woman should be placed in the same way as for lithotomy. The surgeon secures the tumor at its most elevated portion, by means of an erigne, which he immediately confides to an assistant. Then introducing his left forefinger into the rectum, as a guide and sentinel, he commences by circumscribing the mass with an elliptical incision, by means of a straight bistoury, while the assistant gently draws it forward. Continuing to dissect the parts upon his finger, he will find himself enabled in this manner to proceed without danger down to the mucous membrane of the intestine, and to separate from one side to the other, now to the right and now to the left, and from above downwards, the diseased parts from the sound tissues. The arteries divided during this operation are usually so small as not to require either a ligature, torsion or cauterization. Gentle tamponing will suffice to check their hemorrhage. The dressing is so simple that there is no need of describing it, and we treat the wound like all those which are to be cicatrized by second intention.

B. If the tumor were sufficiently movable to enable us, by drawing upon it with one or two erignes, to elongate its base in the form of a fold, three ligatures passed through the tissues which compose it, by means of a curved needle, while the finger protects the interior of the rectum, would enable us to excise it rapidly in front, and to reunite the wound immediately by the suture.

C. Tumors of the vesico-vaginal septum are still more difficult of removal than the preceding; for it is not possible to introduce the finger into the urethra or bladder as in the rectum. It is better to place the patient on the belly and on the edge of the bed, with the thighs flexed, than upon her back or side. A silver sound is then introduced into the bladder through the urethra; the tumor is secured as in the preceding case and is circumscribed by the same kind of incision. But we must afterwards take care to dissect it with extreme caution and not penetrate into the tissues of the vaginal wall deeper than is absolutely necessary. The sound, which the assistant causes by an oscillatory movement to project on the side of the vagina, serves as a guide to the finger, which should always be kept at the bottom of the incision to direct the cutting edge of the bistoury. As soon as the sides and apex of the tumor are isolated we should, while detaching it as in dissecting flaps of integuments from a cyst which we do not intend to open, let the danger fall, that is to say, direct the cutting edge of the instrument rather towards the tumor than towards the vesical septum.

D. The previous threads which I have just spoken of could not, under such circumstances, be introduced with sufficient security to authorize me to venture to recommend them. Their employment however ought to be taken into consideration should the tumor comprise the entire thickness of the septum, or should it be decided upon that, notwithstanding the necessity of perforating the bladder, the diseased mass must nevertheless be extirpated.

E. On the *sides* of the vagina tumors would not incur the risk of these dangers. In that region there is no important part to wound so long as it is unnecessary for us to go beyond the thickness of the canal. If we were obliged to go beyond that point, the operation would be unattended with danger except in relation to the vessels in the neighborhood, and to the purulent inflammation which, if once established in the peri-vaginal tissue, might take on a serious character by becoming effused into the pelvis and peritoneal cavity. This would be an objection here to our undertaking union by the first intention, and an argument for confining ourselves to simple dressing.

#### ARTICLE II.—IMPERFORATION OF THE VULVA.

The absence of an opening in the vulva is frequently congenital. In some cases it results from acquired diseases, while in others it is owing to the presence of the hymen, which, in place of being a simple valve, forms a complete disc, or it may be owing to adhesions that have formed between certain parts of the pudendum. It may also happen that the occlusion of the vagina will be prolonged to a greater or less height in the pelvis, or even extend as far as the neck of the uterus. So long as the young girl has not menstruated the infirmity in question cannot, in any manner, interfere with her health, while in an adult woman it would be unattended, but for the necessity of menstruation, with any other inconvenience than that of rendering copulation impossible. Nevertheless if the surgeon is consulted in good season and should judge the operation to be necessary, he would find an advantage in not waiting for the period of the cata-menia in order to perform it. In fact when the operation is performed with the view of relieving the difficulties which may be caused by the retention of the menstrual fluid, its consequences generally will be found to be more serious than in childhood.

#### § I.

If, as in the cases noticed by M. Fristo, (communicated by the author, 1838,) those by M. Coley, (*Arch. Gén. de Méd.*, 2e sér., t. II., p. 585,) and M. Kulman, (*Ibid.*, t. V., p. 143,) and those which I have elsewhere related, (*Traité d'Accouch.*, t. I., p. 108, 2d edit.,) the vagina is closed only by a membrane, nothing more is required for its destruction than to plunge through it the point of a straight bistoury, incise it freely from before backwards and then transversely, and afterwards to excise its four angles. We then keep the opening properly distended by means of lint or portions of sponge shaped in the form of a tent. Three young girls whom I treated in this manner recovered perfectly. If, before the period of marriage, the employment of dilating means is not persevered in until the cicatrization of the wound is complete, we would incur the risk of its closing up again, or at least contracting considerably, as happened in a young girl six years of age, in whom one of our confreres confined himself to a longitudinal division of the hymen, and as happened in one instance also to myself. It is altogether useless to make at first a puncture through the membrane by means of the trochar, or to have

recourse to the canulated sound to guide the bistoury, or to any other special instrument. The perforation being made, the forceps or scissors curved flatwise, or even the ordinary bistoury, will always be found sufficient for the excision of the flaps.

## § II.

In *adult age* we are not usually called upon to perform this operation, except in women who suffer under symptoms to a certain extent similar to those of pregnancy, and who have the belly voluminous, &c., and this in consequence of the catamenia having no external issue. *If the hymen alone closes the passage*, it is found protruding and tense, and in some cases even of a bluish or dark tinge, caused by the blood which is endeavoring to force it outwards. In such cases the opening into it is still less complicated than in the preceding circumstances. Any surgeon may perform it without danger. Except that the sudden evacuation of so large a quantity of liquid, and the impossibility for the womb and other organs, that have been previously distended, to immediately resume their normal position, render this operation in some cases quite dangerous, from the visceral inflammations and fever of a bad character, which it might give rise to. Perhaps in such cases it would be better not to make use of any effort or pressure to aid the escape of the liquid, but to abandon its expulsion to the natural contractility of the cavities where it has been for so long a time confined. By this means we leave no void in the collection which we have perforated. The air cannot be introduced or become stagnated there, nor react either on the morbid liquid or walls of the cyst, by giving rise to those accidents which are generally imputed to it. Injections, moreover, either emollient, detergent, slightly resolvent, or even antiseptic, should they be indicated, are not to be omitted. Should there be ever so little fever, heat, or pain, in the lower belly, the patient is immediately to be put upon the severest regimen, and under an anti-phlogistic treatment, corresponding in energy to the intensity indicated by the symptoms. *Should the vagina be closed up to a certain distance* from the external orifice, the operation is naturally attended with more difficulty; in the first place because we can scarcely ascertain beforehand what is the length of the obliterated portion, unless there be a sort of diaphragm or septum, which constitutes the obstacle to be destroyed; in the second place especially, because we have to insert the instruments between two important organs, viz., the rectum and the bladder. Before commencing, therefore, we ought by passing a sound into the urethra, and one or two fingers into the rectum, assure ourselves under such circumstances, that there is still remaining a certain degree of thickness of tissue between those organs, that the womb exists and occupies its natural position, and that the vagina in every portion of it is not entirely obliterated; in this last case it might be hazardous to undertake its restitution. Though M. Langenbeck, (*Bull. de Ferr.*, t. XIII., p. 364,) in operating upon a woman who was probably destitute of a uterus, may have succeeded in rendering the vagina permeable, M. MacFarlan, (*Arch. Gén. de Méd.*, 2e ser., t. II., p. 202,) had the misfortune to

fail completely. Nevertheless, if the existence of the woman was endangered by the accumulation of the menstrual fluid, and that there existed the slightest hope of reaching the uterus by making a passage between the intestine and the bladder, we ought, in my opinion, to surmount all fears, and not shrink before the difficulties. Should the surgeon, in fine, decide upon operating, the patient is to be placed in the same way as for lithotomy. If the difficulty in question is a *septum* or diaphragm, it is to be perforated by a puncture with the bistoury or trochar. It will be an easy matter afterwards to enlarge the opening by repeated incisions, or by a kind of process of debridement with the bistoury, conducted upon the finger or upon a grooved sound, if not upon a gorget. M. G. Baehm, (*Arch. Gén. de Méd.*, 2e ser., t. XII., p. 442,) succeeded in the case of a young woman twenty-six years of age, by making use of a dilating cylinder after the puncture. A mulatto in Brazils, (*Rev. Méd.*.. 1832, t. II., p. 473,) was perfectly cured by means of a simple incision. The patient of M. William, (*Ibid.*, 1833, t. IV., p. 451,) who cites similar facts from Haughton, Simpson, and Richardson, also got well after passing through divers accidents. M. Fristo, (communicated by the author, 1837,) though obliged to incise in this manner four successive contractions in a woman who had an imperforate hymen, was no less fortunate. The multiple debridement also succeeded in the case whose history is given by M. Bouchacourt, (*Bull. de Therap.*, t. XIV., p. 285.) While his left forefinger remains in the rectum, and the assistant is holding a catheter in the bladder, and taking care to push its beak towards the hypogastrium, the surgeon, if operating for the removal of an obliteration, properly so called, plunges in the direction towards the vagina, either a long bistoury with a narrow blade, or a trochar armed with its canula.

The absence of resistance and the freedom with which he may turn the point of his instrument in different directions, soon indicate to him that he has passed beyond the point of the disease. He then enlarges the wound a little throughout its whole length while withdrawing the bistoury, the cutting edge of which should even be directed upon the opposite side and afterwards in front and behind, should he feel sufficiently secure of not wounding the surrounding organs. When we have made use of the trochar and there escapes through the canula a dark colored viscous liquid, a grooved sound may be necessary to enable us to enlarge to a sufficient extent the perforation we have made. The introduction of the finger would enable us to ascertain if the division is sufficiently large, and in the contrary case to increase its extent in the direction that may be deemed most advisable. Though the vagina, after an operation of this kind, usually preserves its permeability, prudence nevertheless suggests that we should adopt the necessary precautions to prevent it from closing up again. A tube either of metal or gum-elastic, dilated in the manner of a spindle or spread out externally like a funnel in such manner as to be enabled of itself to remain in place, and gradually increased up to a certain size, would, in my opinion, be the best means to be adopted to attain this result, although meches of lint or linen daily renewed after making the injections, might also answer. Scientific works contain so great a

number of operations of this description, that it would be superfluous at the present time to describe any of them in detail. Every day moreover we find still published additional cases; to those which have been described by MM. Ventura, Cabaret, Delpech, Desgranges, Williaume, Flamant, Renaudin, and many others which I have cited, (*Traité d'Accouch., &c.*, t. I., pp. 109, 110, 111 and 239; t. II., pp. 210, 211, 212,) we may also add those of MM. Keates, (*Journ. des Prog.*, t. XIII., p. 273,) Jefferson, (*Med.-Chir. Review*, vol. II., p. 193,) Coste, (*Journ. des Conn. Méd.*, t. III., pp. 105 and 276,) Amussat (*Journ. Hebdom.*, 1834, t. I., p. 70; *Gaz. Méd.*, 1835, p. 785.) and Fristo, (communicated by the author, 1837,) which are the most remarkable of all. Though almost all those operations, as well as those of MM. Rossi (*Gaz. Méd.*, 1838, p. 682,) and Toulnouche, and those which M. Roux witnessed in Germany, were followed with complete success, it is nevertheless not to be forgotten, that in a case related by Morgagni, the woman died after the expiration of a few days, and that in examining the dead body, the bladder was found extensively laid open, at the same time that one of the fallopian tubes dilated by the blood had burst into the cavity of the abdomen; nor must we forget that Dupuytren has frequently seen accidents of an extremely dangerous character result from this operation. In a patient of M. Morisson, (*Bull. de Fér.*, t. XIII., p. 364,) there resulted from this operation an abscess in the iliac fossa which ultimately opened into the intestine. The patient of M. Langenbeck (*Arch. Gén. de Méd.*, 2d ser., t. II., p. 102) died of enteritis. M. MacFarlan, (*Journ. des Prog.*, t. IV., p. 116,) who, as I have said, operated in a case in which there was no uterus, also lost his patient. I will add that M. Jefferson was obliged to penetrate in his dissection to the depth of five inches before finding the retained liquid; that in one of the cases of M. Fristo he found it necessary from the vagina having been transformed into a cord, to reconstruct it entire by dissecting upon his finger the tissues, layer by layer; and that M. Amussat, operating in a case full as difficult, detached and tore the laminæ of the recto-vesical septum by means of his finger directed from below upwards, to a much greater extent than he divided them with a cutting instrument. M. E. Coste went farther. The vagina was opened into the bladder; having laid open the urethra and afterwards adjusted a cylinder of lint in the bottom of the wound on the side towards the rectum, he ultimately constructed there an entirely new vagina.

[*Vaginal occlusion from traumatic lesion.*—Mr. J. W. Square, surgeon of the hospital at Plymouth, (Eng.) was called to a case of cicatrized vagina in 1843, aged thirty-four years, caused, as it would seem, by the use of the forceps with her first child three months previous. The vagina was quite closed at an inch from its orifice, and emitted a purulent discharge. The partition, however, was penetrated by a probe, and for weeks bougies, catheters, and sponge tents were introduced, but produced only intolerable pain. The surgeon determined upon an operation, which was effectually performed, by pressing the rectum with the forefinger introduced against the sacrum, and then by means of a concealed bistoury passed through the perforation already made with the probe, &c., dilating the par-

tition freely in a lateral direction, first to the left and then to the right side. A large quantity of grumous blood gushed out, probably menstrual,—which had been retained in the upper part of the vagina, which latter organ had been thereby distended into a large oval sac, having, however, a healthy os uteri at its upper part. First a plug of lint, oiled, was used to keep the passage dilated, but being difficult to be maintained in place, a wooden plug was substituted and kept up by a bandage. This last, which was, as we think, injudicious practice, caused much irritation and was, very prudently, soon replaced by a gum-elastic rectum bougie.

Dr. Mott, who has performed a considerable number of these operations, both where there was total or only partial occlusion, and with unvarying success, and with most satisfactory results to such particularly as had had effectual sexual intercourse and utero-gestation completely suspended by this occlusion for years, gives a decided preference to a plug of proper length, rotundity and shape, composed of a portion of sponge nicely adjusted within a cylindrical sac of suitable size, made of thick goldbeater's skin, or thin caoutchouc cloth tissue, kept constantly oiled when applied, and to be renewed by washing the bag and inserting a fresh, clean, and dry portion of sponge as often as it becomes infiltrated with the utero-vaginal discharges.

The passage should be also, occasionally, say once a day or oftener, cleansed out with an injection of tepid weak soap and water, until cicatrization is completed.

*Imperforate Vagina.*—Dr. W. Shuttice of Mathews, Virginia, (*Amer. Journ. of the Med. Sc.*, new series, vol. VII., Phil., 1844, p. 243, 244,) in a case of imperforate hymen in a young lady aged eighteen, who had never menstruated, and who, in consequence, had her abdomen so distended as to give rise to the suspicion of a tumor or of pregnancy, successfully relieved his patient by puncturing the tense partition, which gave the patient immediate relief, and as suddenly reduced the swelling by the loss of no less than six pounds of dark, tarry, grumous, uncoagulated, retained catamenial blood. The discharge continued for several days, and the surgeon supposed the patient lost altogether, at the operation and in this interval, some eight pounds of menstrual blood. The cure was, of course, accomplished in this manner at once. All such cases show the necessity of surgeons *themselves* making a close examination *per vaginam*, as false delicacy of young ladies or their relatives often procrastinate relief until it is too late. T.]

### ARTICLE III.—PUNCTURE OF THE UTERUS.

#### § I.—*The Occlusion of the Neck of the Uterus.*

The neck of the uterus, like the vagina, may never have had an external opening, or it may have been closed up by accident. This however is quite a rare occurrence, and one which many practitioners have supposed they had met with, where in fact it did not exist. It is evident, for example, that the neck of the womb was not obliterated in the case quoted by M. F. Hatin, (*Journ. des Conn. Méd.-Chir.*,

1839, p. 111.) The error, moreover, would be so natural in such cases that *M. Galopin*, (*Gaz. Med.*, 1838, p. 714,) who, under the supposition that there was an obliteration of the neck of the uterus, performed the vaginal Cæsarean operation successfully, both for the mother and infant, and who adds that his confrere, *M. Lannelongue*, witnessed the fact, might also have readily committed a mistake of this kind. Nor is it scarcely probable that the occlusion was complete in the patient operated upon by *M. Stoll*, (*Ibid.*, 1839, p. 185.) *M. Pacoud*, (communicated by the author, April, 1839,) who, out of more than 100,000 accouchements, of which we have an enumeration in his school, had not yet met with one instance of this disease, nevertheless appears to have finally encountered a very decided case of occlusion. The first thing to be done after we have ascertained the imperforation of the uterus and its distension by any liquid, is to endeavor to find by means of the finger, some trace of the neck in the place where it ought to exist, and should it be found to endeavor to introduce into it an ordinary sound, in order to remove the impediment. Otherwise we must proceed to its perforation, which has now been performed a great number of times, with various sorts of instruments. Some recommend that we should first make a puncture by means of the trochar; others that we should prefer the straight bistoury wrapped in a small band to within some lines from its point. Even the pharyngotoine has had its partisans. *Dance* relates that *Barré* used a long canula, including a spear-shaped stilette, which latter had a groove upon its concavity. In this matter each may follow his own pleasure and select the instrument which is most agreeable to him. It is evident, moreover, that a bistoury of some length, concave and wrapped in linen, and guided upon the left forefinger, would fulfil all the indications, and that the sound with its spear stilette, (*sonde à dard*,) or any trochar whatever, or the pharyngotome, would equally attain the object in view. However this may be, the trochar and the bistoury are in my opinion the two instruments which ought to be preferred. All that is necessary is to make an opening sufficiently large for the liquid to escape, and not to venture too far towards the bladder or rectum. As in the case of the vagina, we must also be on our guard against a return of the difficulty, and do all in our power to prevent the opening we have made from closing up again, unless the natural neck of the uterus has ultimately become re-established. We should therefore endeavor to introduce into the uterus the end of a gum-elastic sound, in order to keep the wound open. In the operation which *M. Hervez de Chégoïn* performed with success, he had recourse to a trochar whose canula served for the introduction of a bougie, which in its turn was used as the conductor for the end of a sound destined to remain in the wound, and which was subsequently replaced by a female catheter. This is the most prudent course of treatment we can adopt, and which almost all practitioners have deemed it advisable to pursue, whether they have used the trochar, bistoury or any other instrument. Having spoken in detail in another work (*Traité d'Accouch.*, t. II., p. 216) of the obliteration of the neck of the uterus during pregnancy and of the remedies it requires, there is no necessity of my dwelling upon it any longer in this place.

*§ II.—Retroversion.*

Puncture may also be required for another disease ; I mean retroversion of the uterus during pregnancy. When the reversion backwards has continued beyond the third or fourth month, it is sometimes found impossible to effect the reduction. The cause of this difficulty lies in the constantly increasing volume of the uterus. The remedy in a desperate case, which would naturally present itself to the mind therefore, would be the extraction of its contents. But as the delivery of the infant should not be undertaken, we have no other resource than to extract the liquid contained in the membranes of the foetus. Puncture of the uterus, which had already been recommended by Hunter in cases of retroversion, has been frequently performed with success. M. Jaurel, of Rouen, has published a case, and another occurred at Lyon, under the notice of MM. Voucel and Bouchet, while M. Baynham has furnished a third. The woman being placed as in the preceding cases, and supported by assistants, the surgeon endeavors to find in what direction towards the rectum or vagina the uterus is most strongly inclined. A rule which is not to be infringed upon, is to begin by doing all in our power to reach into the uterus through the opening in the neck. When we find this impossible, puncture through the vagina will be attended with less danger than through the rectum, inasmuch as it does not unavoidably lead to a perforation of the peritoneum, and does not expose us to the same danger of wounding the placenta. It was however, through this last mentioned organ that M. Baynham effected his puncture, because probably the development of the womb was much more considerable in that direction than towards the vagina. We must admit, however, that in general the employment of the trochar leaves behind it no fistulous opening either in the intestine or uterus, and that the wound closes up almost as soon as it is withdrawn. In the case of M. Baynham, only about two ounces of fluid escaped through the canula, which however was found sufficient to enable him to effect the reduction. Abortion took place at the expiration of a few days, and the foetal envelopes, which were found entire, still contained several ounces of water : the placenta had been perforated, as well as the abdomen of the child. In such cases, the trochar should have more length than that used in ordinary paracentesis, and should be somewhat curved. That of Fleurant, for puncture of the bladder through the anus, would answer very well. As it may become caught in the placenta, and as the foetus or cord might close up its opening, it is well to plunge it in to a sufficient depth, and to have a stilette of such length that it may go beyond the canula, to clear out its upper opening, and thus enable the liquids to escape. After a puncture of this kind, we should hasten to replace the uterus in its natural position. The treatment afterwards required, would very naturally comprise nothing more than the precautions necessary during pregnancy, were it not that abortion is almost inevitably the result of this operation.

## ARTICLE IV.—REVERSION OF THE VAGINA.

§ I.—*Excision of the Integuments.*

M. Dieffenbach (*Gaz. Méd.*, 1834, t. II., p. 20,) has suggested that in place of reducing the reversed vagina, and restricting ourselves to keeping it in its place by means of pessaries, we might apply to this prolapsus with advantage, the method long since adopted by Dupuytren, for that of the rectum. He commences therefore, by effecting the reduction of the organ ; then, in order to prevent the return of the prolapsus, he excises entirely around its vulvar opening the relaxed folds of the inner surface of the labia majora, or perineum. This is done without any difficulty, by means of the forceps, and a good pair of scissors. The folds removed, should leave the same number of radiations whose centre of convergence is in the vagina, and be arranged in such manner that their extremities penetrate from half an inch to an inch into the interior of this passage. The dressing consists of nothing more than cleansing daily these small wounds, or if, in order to obtain an inodular cicatrix, we encourage their suppuration, we introduce a meche of considerable size, the base of which might readily furnish a small pledget to each of these incisions. The object in view by this operation, is to contract the vulva and the entrance of the vagina, by imparting to these organs a degree of solidity and resistance which they had been for a long time deprived of.

§ II.—*Excision of a Flap of the Vagina.*

Though followed by a successful issue, the process of MM. M. Hall and Heming, (*London Med. Gaz.* and *Gaz. Méd. de Paris*, 1832, p. 32,) and which consists in excising a large elliptical flap from the mucous membrane, and in the immediate reunion of the wound by suture, would evidently be much less adapted than the preceding operation, to the reversion of the vagina. I shall return however to this process when speaking of prolapsus of the uterus and diseases of the rectum.

Should the prolapsus be ancient and the tumor have undergone such degenerescence or transformation, as to render its reduction utterly impossible, as appears to have been the case in the instance published by M. Bérard the younger, and should the patient have absolutely made up her mind to be relieved of it, there is evidently no other resource to offer her than extirpation. Unfortunately, it is difficult in such cases to ascertain with certainty if the vagina alone has prolapsed, and that the uterus is not included in the diseased mass, so that the operation would necessarily be attended with serious dangers. It would be performed, moreover, in the same manner as we shall describe in speaking of ablation of the uterus, whether we should have deemed it advisable to use the cutting instrument or have given the preference to the ligature.

## ARTICLE V.—PROLAPSUS (descente) OF THE UTERUS.

Since the first publication of the preceding portion of the text, the method of contracting the vagina as a remedy for prolapsus of the

uterus, has been introduced into practice under various forms. Some have proposed for this purpose cauterization, or scarification of the tissues, while others have recommended to slough off flaps from the vagina by means of the suture. There are those again, in fine, who restrict themselves to the contraction of the vulva.

### § I.—Cauterization.

It is in France that the general method originated under two principal points of view. In 1823, M. A. Gérardin transmitted to the Medical Society of Metz, a memoir, which he also addressed in 1824 to the Royal Academy of Medicine, and upon which M. Beaude-loque (*Arch. Gén. de Méd.*, t. VIII., p. 132) was appointed to make a report. In this treatise, which I have read in manuscript, the author proposes as a remedy for prolapsus of the womb, that we should contract or obliterate the vagina by cauterizing its interior. Since that time this recommendation has been adopted in various hospitals. In 1833, M. Laugier attempted to cure one or two women in this manner, by making use of the nitrate acid of mercury. Being myself also desirous of ascertaining what virtue it might possess, I treated, by means of cauterization with the red hot iron in 1835, at the hospital of La Charité, a woman who had been for a long time afflicted with a prolapsus of the uterus, and I have understood that an attempt with cauterization had also been made use of for the same purpose, but without success, at the Hospital of St. Louis. It has been considered that to obtain success, it would be necessary to cauterize either by means of chemical substances, or the red hot iron, several lines upon the vaginal cavity to such degree as to cause them to mortify to a sufficient depth, and to become transformed into an eschar, from the neighborhood of the neck of the uterus as far as to the vulva. Considered in itself, the operation is exceedingly simple; having inserted into the organs a jointed speculum, or that of Dugés or M. Ricque, or any other, we apply a pencil charged with caustic matter, or the reed-shaped cautery, either upon the two sides or the posterior median line, or upon some other intermediate spaces of the vagina, in such manner as to destroy their vitality.

It is important not to forget, while we are proceeding in this manner, that the bladder and urethra are in front, the rectum behind, and the cul de sac of the neighboring peritoneal cavity very near the posterior lip of the neck of the uterus. During the time the eschars are being exfoliated, we confine ourselves to emollient injections, general baths and antiphlogistic treatment. At a subsequent period we promote the cleansing and cicatrization of the wounds, by detergent, and afterwards resolvent injections, and place the patient on a more substantial diet. Having now established in this region wounds with loss of substance, the surgeon has reason to expect that after their cicatrization the vagina will necessarily be contracted by them, and that being intermingled with inodular seams, they will be capable of presenting an obstacle to the descent of the uterus. Doubtless, we cannot assert that success would never crown an attempt of this kind. The bridles, septa, and coarctations of every description, which are sometimes accidentally formed in the vagina, and

which I have spoken of above, are a sufficient evidence that the uterus is, under such circumstances, compelled in some cases to remain above the vulva. A neck which did not allow of the introduction of the little finger, and which was found in the vagina, at the depth of two inches and a half in a lady whom I saw with M. Berigny de Meulan, perfectly fulfilled in that part the function of the best constructed pessary. A semilunar septum, situated an inch higher up, performed the same office in a lady whom I saw with M. Andral, the father. I have already spoken of a patient of M. Gérardin, who after having had a pessary for several years successively, imprisoned in these parts, found herself after the extraction of this body, cured of her prolapsus by means of a circular contraction formed on the middle portion of the vagina. It is, nevertheless, true that these coarctations are not effected without difficulty, that the women treated in this manner by M. Laugier, have had their prolapsus return, and that the disease was also reproduced in the woman operated upon by me at the Hospital of La Charité, though I had cauterized to a considerable depth four radiating lines on the vagina. The pliancy and distensibility of the tissues, and the quantity of fluids which readily accumulate in these parts, all present an obstacle to our procuring in this region, at pleasure, a solid and durable contraction. As it is an operation, moreover, which would not be unattended with danger, it does not consequently, in my opinion, deserve to be retained in practice.

### § II.—*Excision.*

Contraction effected by means of excision, first attempted by M. Heming, (*Gaz. Méd.*, 1832, p. 32,) and afterwards by M. Ireland, in 1834, and by M. A. Bérard and myself, in 1835, already enhances several modifications. M. Berard has followed in every respect the process of M. Ireland; that is to say, that after having excised from each side of the vagina a strip near an inch wide, and from two to three inches long, he has reunited the wound by means of the suture. The patients, who at first appeared to have been effectually cured, have, nevertheless, had their infirmity return upon them shortly after. Inasmuch as the walls of the vagina are under such circumstances very much thickened, or as it were hypertrophied, and that there is almost always existing at the same time a reversion of the bladder or rectum, that is, a *cystocele* or *rectocele*, I have deemed it better to make the incision of the tissues in front and behind rather than on the sides. Desirous, moreover, of rendering both the incision and suture more easy, I have commenced by placing the threads through the base of the fold which is to be removed. Afterwards detaching the entire organic strip, I have found it exceedingly easy to unite the borders of the wound, by knotting each of the threads, and thus completing the suture. For this purpose I place the woman on her back; I then secure by means of an erigne, and as high up as possible, the median posterior crest of the vagina, while an assistant, in the same manner, raises up its perineal extremity. Immediately consigning the two erignes to the assistant, I introduce the forefinger of the left hand into the rectum, in order to protect the movement of the curved

needle, which latter, conducted by the right hand, is to pass three or four double threads through the base of the vaginal fold, taking care to commence with the one which is to be highest up, and to terminate with that which is nearest to the vulva. Another assistant holds all these threads stretched out, while the surgeon provided with a good bistoury, divides the tissues on one side, and then on the other, and finally from above downwards, at the distance of three lines inside of each point of suture. The same manipulation is to be made use of upon the anterior median line, after which nothing is easier than to reunite the wound by knotting each of the threads on one of its sides. Having cut near the knot one of the halves of each ligature, the surgeon gathers the remainder together, and brings them into the fold of the groin, where he fastens them under a piece of adhesive plaster. The ligatures rarely come away until after the expiration of from six to ten days. Sometimes, in fact, they do not cut through the tissues, but seem to be relaxed, and would soon act in the same manner as a seton, if we did not take the precaution to cut them. A patient whom I operated upon in this manner, in 1835, and who appeared to be cured during nearly three months that she remained in the wards of the hospital, had when she resumed her labors, a few weeks after, a return of her prolapsus. I operated upon another woman, in 1838, with a complication of rectocele, and who died three months subsequently of an ulcerous enteritis, the prolapsus in her case also having begun to reappear. But it is proper to add, that in this last case the projection from the vagina was prolonged into the pelvis, by means of a plain, soft cylinder of a vascular and fleshy appearance, three to four inches long, and of the size of a child's fist, and which terminated on a line with the fundus of the uterus, by a kind of globular dilatation of a venous, or as it were fibro-muscular texture, possessing some analogy to that of the uterus. Do these facts suffice to prove that the process of excision does not yet constitute the efficaceous remedy for prolapsus of the uterus or vagina? In answering in the affirmative, I have too much fear that future experience will not reverse my verdict.

### § III.—*Suture.*

A distinguished surgeon of Italy, M. Bellini, (*De la Colpodesmographie, &c.*, 1835,) has proposed to mortify one or two flaps of the vagina by means of a suture which should represent the form of an inverted Ω, and which he prolongs as far back as to the neck of the uterus; but it is at once evident that this process is at the same time more tedious and difficult, and less certain than the preceding ones. In conclusion, I do not believe that these different modes of operating upon the vagina will attain the object proposed, or that it will be long before they fall into disuse.

### § IV.—*Contraction of the Vulva.*

The idea of contracting the vulva for prolapsus of the vagina, and which originated from the practice of Dupuytren for reversions of the rectum as applied to prolapsus of the womb, appears to present

some few advantages over the preceding mode. Certain it is that, made trial of by different surgeons, it has always procured, if we receive in the literal acceptation what they say of it, very encouraging results. M. Fricke, who performs it by a new process, wrote to me in 1835, that at that period he had already used it in twelve instances, and always with success. This surgeon proceeds nearly in the same manner as for suture of the perineum; that is to say, that he abrades the two posterior thirds of the vulva by excision of the tissues, and then reunites the sides of the wound by three or four points of simple suture. The perineum is in this manner found to be prolonged an inch or two in front, in such manner as to close up all egress to the neck of the womb. Taking care to leave an aperture behind and to preserve a portion of the vulva in front, M. Fricke (*Ann. de Chir. de Hambourg*, 1833; *Gaz. Méd.*, 1835, pp. 249, 268) in this manner guards against accumulation of liquids in the vagina, and is enabled subsequently to re-establish the sexual functions. M. Knorre (*Gaz. Méd.*, 1839, p. 185) states that he has succeeded with this operation in one instance. The same was the case with M. Loscher, (*Ibid.*) but though it did not fail in the hands of M. Fricke at Hamburg, I am compelled to state that a patient operated upon by him in my department at La Charité, in 1837, was not cured; that M. Plath, (*Ibid.*, 1837, p. 13,) in making trial of it upon another woman was not more fortunate, and that one of the two patients also upon whom I made use of it did not derive any benefit from it. It is nevertheless certain that this process, denominated *Episiopathy* by M. Fricke, ought to succeed more frequently than those which have been mentioned above. The ruptures of the fourchette and perineum, and the enlargement of the vulva from any circumstance whatever, are, it cannot be denied, the most common predisposing causes of prolapsus of the uterus. It is readily conceived, therefore, that an operation which replaces the parts in their original condition, and which even has the effect to diminish the normal dimensions of the vulva, must hold up the uterus in such manner as to efface the two lowest portions of its prolapsus. As to the operative process, it is moreover precisely the same as that which will be mentioned under the head of *suture of the perineum*. The same weight which is felt from the womb at the fundament, after an operation of this kind, is also found in women who wear a pessary. This difficulty moreover could be remedied in this as in any other case, by means of a *hypogastric girdle*, provided with its infra-crural bandage and its accompanying perineal cushion.

[*A complete prolapsus both of the uterus and vagina*, has been stated in one recent instance at least, to have not prevented the safe delivery even of twins! M. Rathman, (*Med. Zeitung von Preussen*, 1842, No. 33—*Arch. Gén. de Méd.* de Paris, 4e ser., t. II., p. 231, &c.) relates a case of this kind in a woman who had had incomplete prolapsus of the parts in question from the age of sixteen, and who, when she was arrived at the age of twenty-two, was on February 17, 1842, delivered by him of two well formed twins at the full term, but dead, by means of the forceps; not, however, without much difficulty and laceration of the parts. The woman, however, recovered. T.]

## ARTICLE VI.—REDUCTION OF THE WOMB AND VAGINA.

## § I.

Whether it be the *vagina* or *uterus* which presents itself at the vulva ; whether the uterus descends to that part and exhibits there its neck, or after having been everted upon itself, shows itself there in the form of the finger of a glove ; whether the third half or whole of it has protruded ; or whether, on the contrary, it has only been retroverted in the interior of the pelvis, certain it is, that the reduction and replacement to be effected exact the observance of certain rules, whose importance is not to be overlooked by the surgeon. These displacements are sometimes accompanied with symptoms which require at first some attention on the part of the practitioner. There are some of these which are to be removed before returning the organ, and others which cannot in reality disappear until afterwards. Inflammation, fever, and symptoms of general reaction, are evidently those which belong to the first class ; while leucorrhæal discharges, excoriations, and ulcerations, belong to the second. The engorgement and painful state of the tumor even, should not arrest us, unless they present an actual mechanical obstacle to the return of the parts. In fine, the best remedy, the best calmant, and the surest antiphlogistic means also, is to be found in the reduction, whenever it can be effected. If it is the vagina, after having wrapped the entire surface of its border in linen besmeared with cerate, we make gentle pressure upon it with the fingers from the circumference to the centre, before pushing it from below upwards. The uterus everted upon itself would require the application of the same linen ; but it might be advantageous to direct the ends of the fingers upon the most projecting point of the tumor, in order to make it return with more certainty, and to push it up completely above the superior strait. When there is nothing more than a fall or prolapsus of this organ, we also envelope it in linen, and in the same way as for the vagina endeavor to contract its base a little, at the same time that we push back its apex, in the direction of the axes of the pelvis.

## § II.

If the case is one of *retroversion*, it sometimes becomes necessary to vary the position of the patient, who in the preceding cases may remain in a horizontal position, at the same time that her limbs and all her muscles are kept in a state of relaxation. The first thing to be done to straighten the uterus, when it has become retroverted in the pelvis, is to secure, by means of the fore and middle finger of one of the hands, the periphery of the os tincæ (*le museau de tanche*,) which usually is found to have become lodged behind or above the pubes. If this does not answer, we introduce some of the fingers of the other hand into the rectum, in order to push the fundus of the organ upwards and forwards, while on the other hand we endeavor to make its neck descend. But when these attempts do not succeed, it is recommended to place the woman upon her knees and elbows, in order that the abdominal viscera, by their weight, may

assist in drawing the womb towards the umbilicus, at the same time that the surgeon is endeavoring to dislodge it. If all these resources fail, we may, should it be practicable, imitate Dusaussoy, who, introducing the entire hand into the intestine, was enabled to overcome difficulties which no other means could remove but that. Finally, if the finger could not get a sufficient hold upon the neck, we should, after the manner of M. Bellanger, introduce into the bladder through the urethra, the flat catheter of Ségrot, or any other of the same form, or as I have done in two instances with advantage, an ordinary male sound, which could be afterwards used as a hook by turning its concavity backwards. I have no necessity of remarking, that for simple displacements of the uterus in the pelvis, and in all circumstances where it is practicable in other cases, we should begin by emptying the bladder by means of the catheter, nor that in certain cases we may very conveniently grasp the organs to be reduced by means of the fingers directly, without the necessity of covering the parts with linen. Repose, the horizontal position, the proper kinds of injections, one bleeding, and the antiphlogistic regimen in general, are applicable to the sequelæ of this operation, as to those of most others, for the purpose of calming the irritation which must have been produced, and for enabling the tissues to resume their customary functions.

#### ARTICLE VII.—PESSARIES.

The name of pessary, which was formerly understood to mean any substance introduced into the vagina to support the uterus and prevent its displacement, is no longer applied at the present day but to certain instruments of a determinate form. Thus the bladder, which Columelle introduced into the genital parts of cows where he filled it with air, which bladder certain surgeons afterwards made use of in the same manner in women; together with the masses of linen and tow mentioned by Moschion and Absyrite, (*Peyrillie, Hist. de la Méd.*, p. 38,) are at the present day designated by other names.

##### § I.—Pessary of the Vagina.

Among the pessaries which are still used at the present day, there are some whose object is to keep reduced the hernias which have protruded through the walls of the vagina, or to prevent the prolapsus and eversion of this organ itself; while others are exclusively designed to prevent the descent and deviations of the uterus. The first class may be divided into two orders. Some consist of a hollow cylinder about four inches long, and of a sufficient diameter to fill up the whole organ; these are called *bung pessaries*, (*pessaires en bondon*.) The others, contrived by M. J. Cloquet, differ from the preceding in this respect, that they are somewhat flattened, and also concave in front, slightly dilated at their extremities, and having only quite a small canal in their centre. The name of *elytroidal pessary*, by which this professor has designated them, would be more applicable as it is seen to the pessaries *en bondon*, since the former merely signifies a pessary in the form of a sheath; but the name is a matter of little importance so long as we understand their construction.

Both are introduced in the same manner. The woman is placed upon her back, while holding her thighs and legs moderately flexed and kept apart. The pessary being besmeared with cerate, is introduced at its smallest extremity, like a speculum, into the entrance of the vagina, and then pushed into the cavity of this organ from below upwards, and from before backwards. The elytroidal pessary, from having a greater breadth in one direction than in the other, is to be introduced flatwise to the great diameter of the vulva, in such a manner that its posterior angle being the first lodged in the vaginal opening, may serve to depress the rectum as well as the entire thickness of the perineum with a certain degree of force; the other angle of the same extremity is then depressed little by little as it glides under the pubic arch, after which there is no longer any difficulty in making the instrument penetrate into the vulvo-uterine passage. As soon as it has entered into this part, we give it a movement of rotation, which places its convexity towards the intestine, its concavity forwards, its upper extremity under the neck of the womb, and its lower extremity, which is the largest, transversely above the ossa ischia. The bung pessary, from its forming only a sort of tube, whose walls are very thin, may in general be introduced with greater facility; but as it is straight, and makes but little resistance, the organs soon change its form, so that its presence soon ceases to afford any benefit.

### § II.—Pessaries of the Uterus.

A. The pessaries of the second order have varied much more in their form and composition, than those which I have just described. The ancients constructed them of an oval elliptical plate, of wood or cork, which they afterwards covered with a layer of wax; they had them also of gold, silver, copper, lead, and even of tin, and of all kinds of forms. Those which are called *gimblet-shaped*, are either perfectly circular or slightly notched in front and behind, like a figure of 8, or depressed at the same time upon the four extremities of their principal diameters, or they are merely elliptical and flattened, and perforated in the centre. In England, they frequently employ pessaries of a *globe form*, sometimes hollow, at other times solid and perforated or not in their middle portion, and this is the usual practice also adopted in America. Wax and cork have been long since rejected in practice, since they readily become changed in the organs, and do not possess a sufficient degree of suppleness. The same remark applies to the employment of ebony, ivory and silver, unprotected, because of their hardness or weight. Pomarest, (Bonet, *Corps de Méd.*, t. III. and t. IV., p. 103,) however, states that he kept up a prolapsed uterus for the space of ten years, by means of a ball of wax. At the present day they are made almost exclusively of *gum elastic*; except that this substance is occasionally protected by linen, hair, felt, or wool, silk tissue, &c.; in order to have them as solid and light as possible, Mdme. Rondet, who makes use of a steel ring, well tempered, and wrapped in hair and caoutchouc itself, has contrived others, the entire circle of which is hollow and filled with air. M. Houin, a manufacturer of instruments, has prepared some which have the form almost of a solid bung, and which are made out of pure caoutchouc.

Those of M. Tanchou are flexible, and represent the periphery of a funnel which is very flaring, to receive the neck, and with a very short conical beak, to hinder them from turning over. M. Rognetta has proposed some which have still another form.

B. M. Hervez de Chégoine (*Mem. de l'Acad. Roy. de Méd.*, t. II., p. 319) having remarked that the uterus in its descent almost always is inclined outside of the axes of the pelvis, has shown that the form of the pessary ought in some respects to be different for every woman. According to this idea, we require sometimes a ball dilated in front, behind, or on its side, sometimes a bilboquet, bung, gimblet, or cap, whose border depressed in one direction and raised up in another, may be placed between the neck of the uterus and the wall of the vagina against which it is reversed. In this manner we prevent the anteversion or retroversion, and also the anteflexion and retroflexion, as well as at the same time the descent of the uterus.

C. Ivory, which has been rendered *flexible* by the processes of M. D'Arcet and M. Charriere, that is to say, by means of hydrochloric acid and tannin, being more easy to work with, is infinitely better calculated to fulfil these indications than any other substance. With this preparation the pessaries retain their elasticity and flexibility; they cause but little irritation to the organs, less readily undergo alteration than most of the others, and may be constructed of the shape desired, and almost immediately.

D. Physick still continued to use *pessaries of gold or silver*. His are globular, like those of the time of Denman or Clark, and are composed of two capsules united at their base. Those moreover which have a little more breadth transversely than from before backwards, possess the advantage of being introduced with more facility, and of occasioning less disturbance to the functions of the rectum and bladder. They are introduced even with more facility than pessaries of the vagina. The important point is to make them reach into this passage by means of the precautions above mentioned. By means of the finger introduced into their ring or upon some part of their circumference, we are always enabled by that means to give them their proper position, that is to say, to impart a vibratory movement to them, which places them horizontally in the pelvis, with one of their borders posteriorly and the other in front, and with their extremities towards the ossa ischia; in such manner in fact, that the extremity of the os tincæ may rest on the upper cavity of the opening, which traverses its whole substance.

E. Women who have had their *perineum lacerated*, or in whom the vulvar orifice of the vagina is very large, scarcely derive any benefit from pessaries of the gimblet or globular shape, which in general they cannot keep up; so that we are soon obliged to find others which are more perfect, and which may be substituted for them.

F. Those described by Bauhin, and which have received the name of *bilboquet* pessaries, are formed of an ivory or wooden ring, supported by three branches, and terminated by a root some inches long, which is perforated at its free extremity with three or four holes. The cup of this instrument, which is intended to receive the

neck of the womb, has sufficient depth to enable the menstrual or other discharges from the uterine cavity to escape with facility between the three roots of its support. The cords that are passed through the lower openings of this pivot, enable us to fasten it in front and behind upon a girdle which the woman is to wear constantly. Désormeaux having remarked that notwithstanding the notches which are found between the circle of the bilboquet and its tail, fluids sometimes accumulate below the neck of the womb, and acquire there irritating properties, proposed to transform the stem of the instrument into an actual canal, and to give to the cup itself the form of a shallow funnel; but in spite of these precautions, matters will still occasionally become lodged between the orifice of the uterus and the instrument, so that there is not in fact any good reason for giving a preference of this new pessary over the ancient one. If, as some practitioners recommend, and Désormeaux among them, we should confine ourselves to adjusting the beak of the bilboquet above the os coccygis, and in the interior of the vagina, rather than to attach it by means of cords to a body bandage, there would be too much danger of perforating the rectum to justify me in recommending it, even though it should include a cork-screw spring in its pivot, as recommended by M. Récamier.

G. Some persons, with a view to remedy the continual *vascillations* and disturbances to which the instrument is exposed while the woman is walking, have constructed those which have at their lower extremity a plate about four inches long, concave above, pierced with a large opening behind opposite to the anus, and with two slits in front, in such manner that the cords attached to the four angles of this plate, enable it to embrace with sufficient accuracy the whole extent of the perineum from before backwards, and to keep the bilboquet almost immovable in the position we have judged proper to give to it.

H. Saviard, dissatisfied with the pessaries which had been used up to his time, undertook to keep up the uterus by means of a small apparatus which is composed of a *curved spring*, adjusted upon the hypogastrium by one of its extremities, while the other entered into the vagina to make compression there upon a tampon arranged in a proper manner. The one recommended by M. Villermé is based upon the same principle. Its stem represents a large arc, the concavity of which when it is fixed in its situation is intended to embrace the anterior half of the pelvis. It is a kind of a hook, the tail of which being fixed upon the hypogastrum enables its head, inserted in the vagina, to support or suspend the entire uterus. M. Deleau proposes another which, so to speak, occupies a middle place between the bilboquet and gimblet. It is composed of an elastic spring surrounded with caoutchouc and turned into spirals, so that the apex or first ring is fixed, while the last or base remains free, in order that it may be tightened or enlarged as required. When we wish to adjust it, we fix it upon the head of a species of bottle brush or piston, after having contracted its circle to the proper dimensions. Afterwards left to itself in the vagina with its point upwards, it accommodates itself by its elasticity to the dimensions of the organ and runs no risk of being displaced. Preuner (*Thèse de Haller*, French trans.,

t. II., p. 393) describes one which is almost in every respect similar in its form, but I am very apprehensive that its advantages, in fact, are much more apparent than real.

I. Whatever may be the pessary we employ, we must not neglect the precaution of *withdrawing it from time to time*, in order to cleanse it. Unless this were done it might become encrusted with calcareous matters and ulcerate the vagina, and ultimately give rise to serious accidents, too many examples of which are on record. Women moreover soon learn to perform this little manipulation themselves, and to renew the pessary at the proper time, without having occasion of any person to assist them. On its first application it is advantageous to keep the patient for some days in bed; otherwise she might be liable to a degree of weight upon the fundament and to various kinds of irritation, which would be much less to be apprehended when we have given an opportunity to the organs to become accustomed to the presence of the foreign body and to adapt themselves in some respect to it.

J. *Appreciation.*—A question immediately presents itself. Are pessaries in reality of any advantage? There can be no doubt that they may occasion much inconvenience and quite a number of accidents, and that many women even are wholly unable to support them. The pressure which they make upon the rectum and bladder is itself an obstacle to the functions of those two viscera. The neck of the uterus itself, irritated by the contact of a body of this description, becomes lodged and strangulated in the opening of the pessary, which latter in its turn ultimately excoriates and perforates the walls of the vagina, if it does not also the coats of the intestine or bladder. Many examples of this kind of strangulation have been published, (*Bibl. Méd.*, t. XVII., p. 259; *Journ. Gén. de Méd.*, 1826; *Gaz. Méd.*, 1834, p. 536.) If we make use of the bilboquet, in whatever manner we apply it, it inclines more in one direction than in another, and ultimately after a certain length of time depresses the vagina rather than the os tincæ, or at the same time with it. The gimblet itself almost always turns over either in front or behind, and also furnishes but a very poor support to the neck of the uterus. As to the bung pessary, the opening at its two extremities, which is thin and almost of a cutting edge, also very readily wounds the parts. The elytroidal pessary, adapting itself to the vagina and filling up this passage with a certain degree of accuracy, is less liable to be displaced, keeps up the parts more perfectly, requires less assistance to be maintained in its place, and from these considerations possesses much fewer inconveniences than any of the others. But as it forms a more considerable bulk and occupies the totality of the organ, many women find themselves on this account very much incommoded by it and it is difficult to keep it in place. Since *these instruments* then are *so far* from being innocuous, why should they be continued in practice? It is at least certain that they should be proscribed in a number of cases in which they are had recourse to. In a case of simple reversion, for example, or in that of the reduction of a prolapsus or retroversion, pledges and bags made astringent by being saturated with red wine in which roses have been boiled, or by oxycrat or decoction of bark or diluted solution of sulphate of

alum, if introduced and daily renewed in the interior of the vagina during a certain length of time, would answer better than the employment of a pessary. The pessary could also be very advantageously replaced by fine sponges or linen properly prepared and held up in the manner women make use of these during the time of their cataracta, should it absolutely become necessary to resort to mechanical means to keep up the womb. Again, if the fall of the organ was evidently favored by the too great dimensions of the vulva, excision of the surrounding cutaneous or mucous folds, or episioraphy, though more painful, ought still in my opinion to be preferred; so much the more so inasmuch as it would probably effect a radical cure and allow of the continued performance of conjugal duties.

K. A good *hypogastric girdle*, simple when there is nothing more than an anteversion or anteflexion, and combined with a perineal cushion in cases of prolapsus of the uterus, would be a better remedy, moreover, than most pessaries are for these different kinds of displacements.

#### ARTICLE VIII.—FOREIGN BODIES IN THE GENITAL ORGANS.

##### § I.—*In the Vagina.*

The foreign bodies that we are called upon to extract from the vagina are sometimes pessaries or portions of pessaries which have been destroyed. Some other substances, however, have been found there. Dupuytren met there with a pomatum cup, the opening of which was downwards. In the two women mentioned by M. Grenier, (*Thèse* No. 7, Paris, 1834,) it was a case filled with needles, which had been introduced closed, and become opened in the vagina. In the cases cited by MM. A. Cooper and Capuron they were portions of sponge, which had been neglected and left there, and which had become the nucleus of hard bodies. Any person, moreover, may comprehend the varieties of form or substance which foreign bodies may have that have got introduced by chance, or by the volition of the woman into this passage, as well as the kind of accidents which they may occasion. There have been found here pessaries that had been buried, as it were, for the space of 10, 15, 20 or 40 years, and which, after having become encrusted with calcareous matters and undergone corrosion, or even become imbedded with fungous vegetations, have produced pains, inflammations, and the most formidable array of symptoms. In a woman cured by M. J. Cloquet, so great an alteration of the vagina was produced that it was taken for a cancer. Ordinarily they ulcerate, and perforate either the bladder or rectum, and even sometimes both those organs at once. A woman desiring to withdraw her bilboquet broke its stem, and finally forgot that she left its ring in the vagina; at the expiration of a long period of years she was seized with symptoms which obliged her to solicit the extraction of this foreign body. Dupuytren was then enabled to ascertain (*Bull. de la Fac. de Méd.*, t. VII., p. 136,) that it made a projection at the same time into the rectum and the bladder. M. Bérard has published a still more remarkable case, and to which I myself was witness. The woman, who was very advanced in age,

had quite forgotten her pessary since she had broken its stem twenty-five years before. It could be felt naked in the bladder by means of the sound, and very distinctly in the rectum with the finger. The vagina, which was almost completely obliterated below, formed no longer anything more than a species of cul de sac having a small aperture in its upper part. In the case communicated by M. Larroche to M. J. Cloquet, (*Thèse de Concours*, 1831, p. 100,) the stem pessary had perforated the rectum, where its cup had become the nucleus of a stercoral calculus, while its pivot occupied the centre of a urinary calculus in the interior of the bladder. As the operation which is to be performed under such circumstances must vary according to the cases which require it, it could scarcely be submitted to any special rules. If the pessary still continued to be free and nothing more was required than to subdue the irritation which it produced, the forefinger introduced into its ring or on one of its borders, would be quite frequently found sufficient to effect its extraction. If it were otherwise, a long polypus forceps could be advantageously substituted for the fingers, or we might try to succeed better with a blunt hook guided and protected by the forefinger of the left hand. When it projects into the rectum and cannot be withdrawn through the vagina, we endeavor to grasp it and bring it out in the same manner through the anus. In cases where its size is an obstacle to the success of the operation, it may be found useful to break it up into fragments. If it is of ivory or wood, or any fragile substance whatever, we may do this quite readily by means of a strong cutting pliers or solid pair of forceps. The same cannot be said of metallic pessaries. In such cases we have no other resource than to make use of the file, which of itself would be of but very little advantage, or of a small saw introduced into the rectum and protected by a suitable canula, while we held the foreign body by means of a forceps in as complete a state of immobility as possible. It was with the saw that Dupuytren effected his object in the case which has just been mentioned. In a patient whom I saw at La Pitié, M. Lisfranc began by incising the front part of the anus and a portion of the perineum, in order to obtain a wider entrance. He then grasped the pessary without any great degree of difficulty, and effected its extraction by a forceps held in the right hand, while the fore and middle fingers of the left hand regulated the movements of the instrument at the bottom of the parts. In operating since on two similar cases, one at the hospital of La Charité, and the other a patient of M. R. Gérardin, I did not find it necessary to incise the perineum. The position of the woman and the precautions necessary, before and after the operation, are the same as those for all the other processes which we have been describing in the preceding articles. If a tumbler or vessel, either earthen or of wood, should produce accidents in the vagina, it would become necessary after having in vain endeavored to place them in the most suitable position and to extract them entire, to break them in their place and to remove them by piecemeal. Moreover, the intelligence of the surgeon will know how to supply the deficiencies to which books are necessarily reduced on this subject. The consequences of the operation are usually very simple, unless the intestine or bladder has been perforated.

It is remarked, that even in such cases fistulas soon become considerably reduced, and frequently even finally close up entirely of themselves. Another peculiarity, no less remarkable, is this, that after the pessary has been extracted, the descent of the uterus, in a considerable number of cases, does not again take place. The vagina, which has become indurated and contracted, and occasionally transformed into inodular tissue below the cul de sac, which had been long occupied by the foreign body, contracts still more when this latter is removed, and to so great a degree as to present an obstacle to the womb and to retain it above. The woman whom I operated upon in 1838 with M. Gérardin, presented a fine example of this modification.

### § II.—*In the Uterus.*

The uterine cavity sometimes contains free inorganic masses, which Louis has described under the name of *stones of the uterus*. These stones, which M. Roux and Dupuytren supposed to be produced by transformations of fibrous tumors, have been frequently noticed. I have myself seen them both in the interior of the organ and in the midst of its tissues. It is certain that in a considerable number of cases the masses in question are nothing more than simple earthy concretions or the detritus of pregnancies. One of those which I had an opportunity of examining was of the size of a large egg, round and bosselated, and enclosed in many parts of its tissue, hairs and some particles of osseous as well as cutaneous tissue, while its entire circumference was nothing more than a simple calcareous incrustation. As they might give rise to accidents, they have necessarily, on that account, attracted the attention of surgeons. Hippocrates speaks of a midwife who extracted one of these from the vagina of a domestic. Aetius, who makes mention of them, recommends that we should endeavor to make them pass into the vagina by introducing two fingers into the rectum while the other hand is applied over the hypogastrium, so that we may push them from above downwards in order to grasp them with the tenaculum; he also made use of dilatation and incision of the neck of the womb. Louis thinks that we might introduce into the os tincæ a pair of scissors with their cutting edges on the back, in order, by this means, to divide and enlarge the orifice of the womb from within outwards, and thus favor the egress of the calculus. In this method there is but one difficulty, and this is to ascertain whether the symptoms which the woman suffers under are attributable to the presence of these foreign bodies or to other affections. As it is frequently impossible to ascertain this with certainty, nobody at the present day would venture to make trial of the operation of Aetius any more than that of Louis, unless however the stone could be recognized in the neck of the uterus, to which part it had become approximated, or into which it had more or less protruded.

### ARTICLE IX.—POLYPI OF THE UTERUS.

There is no method of treatment recommended for polypi in general, or those of the nasal fossæ in particular, which has not been

applied to uterine polypi. These last nevertheless have not, in this respect, excited the genius and invention of surgeons to so great an extent as the first. Cauterization, which seems to be alluded to by Celsus, and which was still eulogized by Verduc, Volter, &c., and also scarifications and the use of desiccants, as mentioned in the work of Aetius and that of Moschion, have been long since abandoned. On the other hand the tearing of them out merely or making use of torsion with this, would be applicable only in a small number of cases. If, moreover, the treatment of these diseases should appear, according to Sabatier and many of the moderns, to have been so much neglected by the ancients, the reason lies in this, that until quite a recent epoch they have been designated in medical works under the name of affections which are exceedingly different. Philoténus, (Peyrilhe, *Hist. de la Méd.*, p. 115, in 4to,) for example, evidently confounded them with cancer, and Moschion with varices of the uterus. We can no longer entertain any doubt on this subject, when we see the mysterious Aspasia describing *hemorrhoidal tumors* which *sometimes originate on the neck, sometimes at the fundus of the womb, but rarely on the external genital organs; tumors which are to be excised without any hesitation when they are hard and white*, which are to be tied when they have a great tendency to bleed, and among which some are found which *resist every remedy*.

### § I.—*Varieties.*

In order to comprehend the relative value of the operative processes applied to uterine polypi, and to reconcile the different writers who have treated of them, it becomes indispensable to say a word respecting their *origin and nature*. It can longer be disputed at the present day that there may be developed in the uterus tumors which differ very materially from each other.

A. The small polypus mentioned by Z. Lusitanus, and the excision of which was accompanied with so copious a hemorrhage, may be compared to the *vascular* or *vivacious polypi* which are so frequently observed in the nasal fossæ.

B. M. H. Bérard has noticed in the neck of the uterus *soft polypi*, which were almost entirely mucous, or to a great extent similar to those of the nose. I have seen in three instances in the uterus of women, used in dissections at the Ecole Pratique, tubercles of variable volume, containing small vessels, and which were continuous with the tissue of the organ and yet without any pedicle.

C. Dance, M. Bérard and M. Cruveilhier, as well as MM. Mayer and Meisner have, like myself, met with those which appeared to have been the result of an actual partial hypertrophy, either of the body or neck of the uterus; that is to say, that they were continuous without any line of demarcation with the fibres of this viscus, from the structure of which, moreover, they differed in no respect whatever. I published, in 1825, a case of this kind, the morbid specimen of which I have preserved in alcohol.

D. There are others which are also continuous with the tissue of the uterus, but which are evidently a degenerescence or *transformation* of this organ. These last are hard, elastic, and of a greyish

color. When they are cut into, they present the appearance of a lardaceous, semi-cartilaginous, homogeneous white substance, destitute of vessels, and in which it is impossible to recognize the slightest appearance of fibres. I have had occasion to excise some of this description, and in which all these characters existed in the most marked degree.

E. The most common, by far, are nevertheless those which, since the labors of Bayle, M. Roux and Dupuytren, are designated under the name of *fibrous bodies*, and which are primitively developed between the layers, and in the tissue of the uterus itself. The three cases of *carcinoma* of the uterus related by Pottier, (Bonet. *Corps de Méd.*, t. III., p. 492, and t. IV., p. 492,) who, after having tied and drawn, and depressed the tumor to the vulva, effected its excision, also the cases of *fungus* of the uterus extirpated by Ollulaire, (*Ibid.*, t. IV., pp. 29. 31,) in two different women, and the enormous sarcoma extracted from the vagina, by Behrens, (Theses de Haller, *Sous-Vater*, t. II., p. 179, 1718, French trans.) are evidently to be classed with these fibrous bodies. Certain facts induce me to believe that these last mentioned tumors quite frequently result from an effusion of blood or from a fibrinous concretion, which has been scarcely organized, but continued to retain its vitality, and to grow by imbibition in the midst of the surrounding parts. Exhibiting always a tissue of fibres, intercussated in various directions, and grey or whitish, as in the preceding species, these also do not contain any vessels, and are covered over with a layer from the uterus, which is so much the more attenuated in proportion as they are larger in dimensions, and which may be so much the more easily recognized in proportion as we approximate to their pedicle.

F. *Fibrinous Polypi*.—A woman, 32 years of age, sought my advice, at the Hospital of Saint Antoine, in 1828. For a month she had occasionally observed a slight discharge. Upon introducing the finger, I found a mass of the size of a small egg, somewhat swollen, of quite a firm consistence, and which was prolonged by a distinct pedicle as far as to the upper part of the neck. I supposed it to be a polypus, and the patient was placed in a bath, and underwent during the space of three days, preparation for the operation. Having introduced my finger into the part, I again encountered the mass which I had at first recognized; but in endeavoring to reach its pedicle, I caused it to fall into the vagina, and thus extracted it. It was a fibrinous concretion, or simple clot of indurated blood. Thus we have a new variety of polypus, in other words, *fibrinous polypi*. A sanguineous concretion, resulting from the catamenia, or some discharge of blood, engrafs itself upon the neck of the uterus, and ultimately becomes organized there. I have now seen four examples of this kind at different degrees of organization. Did not the polypus in the form of a cyst, with a long pedicle, as noticed by M. Arnott, (*Encyclogr. des Sc. Méd.*, 1836, p. 315,) and which originated on the anterior lip of the neck, belong to this species?

G. *Cancerous Polypi*.—Schirrous or encephaloid tumors developed in the tissues of the walls, or in the cavity of the womb, may descend and dilate the neck, and present themselves in the vagina, under the form of a polypus. Three women were seen in this state at La

Charité, in 1836, 1887 and 1838. I saw a fourth instance with MM. Roux, Marjolin and Sanson. A surgeon exhibited to the Academy of Medicine, under the name of a polypus, a tumor which he had extirpated in a patient whom I subsequently saw with M. Magistel, and who in reality was affected with a cancer. In the case of M. Arnott, (*Encyclog. des Sc. Méd.*, 1836, p. 315,) this description of cancer caused an inversion of the uterus.

H. *True polypi* may in their turn be mistaken for tumors of another character. In 1823 MM. Richerand and J. Cloquet removed one of the size of a child's head, which had hung for a great number of years to the vulva of a woman, and which they supposed to be the extirpated uterus itself. This body when laid open presented a cavity in its centre, and almost all the other characters of a uterus to so great a degree, that it was considered of a nature to demonstrate beyond dispute, the practicability of an amputation of the organ. The patient died, and the uterus was found entire in its natural position—noting more had been removed than an enormous polypus! A woman from the country, who came to the hospital of Perfectionnement in 1824, in order to have reduced, what she called a *falling down* of the uterus, had at the vulva a conical tumor with a small transverse cleft at its top, which she had kept up for a long time by means of a pessary, and which I readily pushed back into the vagina and supported with a bilboquet. This woman having returned home, after the expiration of a few days was seized with pains in the abdomen, which induced her to come back to the wards of the hospital, where she died the next day but one of a peritonitis. The tumor which I had reduced was a polypus attached by means of a pedicle of the size of a finger to the fundus of the uterus, which latter had been inverted!

I. *The point of insertion* of uterine polypi varies greatly. Those on the fundus of the uterus, if their pedicle is somewhat large, rarely descend into the vagina without giving to the neck of the womb the appearance of a simple ring, which might readily lead to the supposition of an inversion of the organ. A woman who was sent to me by M. Villette de Compiègne, and who died before being operated upon, was in this condition. I have seen two polypi with long pedicles originating at the summit of the neck, one from the anterior and the other from the posterior lip. M. Arnott mentions a similar case. In the interior of the neck as well as in the cavity of the womb, the pedicle is almost always found external to the median line, and allows of the finger or probe being passed along its side or above it. In a young woman, however, upon whom I operated successfully, it adhered throughout its whole circumference, though the dilated portion of the tumor was scarcely larger in size than a nut.

J. Polypi of the uterus, whatever may be their species, vary scarcely less in their *form* than in their point of insertion. In the case of a lady the polypus was globular, half the size of a nut, and adherent in the manner of a projection against the fundus of the organ. I have seen those that were fibrous, cancerous, fleshy, and mucous, of much larger size, and which retained this form, or where one of the halves was imbedded in the natural tissues, while the other projected in the shape of a bump upon the interior of the

uterus, or of its neck. It would neither be easy or prudent to attack those of this description. Though isolated, they continue to be globular, and are not elongated into the shape of a pear so long as they are entirely included in the uterine cavity; it is only when they arrive in the vagina that they become pyriform. In a lady whom I saw with M. Lacournère, the polypus, which had its root in the uterus, extended itself under the form of a cylinder or penis as far as two inches outside of the vulva. An analogous fact was noticed by Gaches, (*Soc. Méd. de Montpellier*, t. 33, p. 31,) and the same modifications have been seen in polypi of the vagina, properly so called. Frequently there exists several polypi at the same time. Cancerous, fibrous, and mucous polypi, are those which especially multiply in this manner. In 1838 I operated upon a woman who thus had four granular pediculated polypi, of the size of an almond or raisin-seed, in the cavity, and on the lips of the neck of the uterus.

### § II.—*Spontaneous separation.*

When fibrous polypi have protruded through the neck of the uterus they undergo a species of strangulation, which in some cases ultimately brings about their separation. Levret has related two examples of this kind, noticed by Mercadier and Louis. Mauriceau, Ruyssch, and Hoffman, and before them M. Donatus and Rhodion, had mentioned similar instances. Vacoussin, Gooch, M. Hue, (*The Lancet*, 1828, vol. II., p. 311,) and M. Hervez de Chégoine, have also related cases of this kind. I have had occasion myself to see one which yielded suddenly to slight movements which I made use of in order to bring it out at the vulva. Finally, M. Griffith, (*Ibid.*, 1829, vol. I., p. 24,) and M. Guillon state that they have obtained the same result by the use of spurred rye, (ergot.)

### § III.

It was this spontaneous separation of certain polypi which must have suggested the first idea of the method of *arrachement*, which had already been employed by Dionis, Juncker and Heister, and which Lapeyronie and Boudou have not hesitated again seriously to recommend. These authors at the same time advise torsion of the pedicle, in order either to tear out the polypus with more facility, or to protect ourselves with greater certainty against hemorrhage. Torsion, combined with simple tractions, being calculated to become dangerous by drawing upon the tissue of the uterus, Hevin undertook, at the schools of surgery, in 1753, to sustain a thesis wherein he showed, that by holding the root of the tumor by means of a forceps at its upper part, while at the same time we turned it upon itself, this danger would no longer exist. M. Pécot, (*Arch. Gén. de Méd.*, 3d ser., t. II., p. 382,) who recommends this for soft polypi after parturition, alleges that he has derived decided advantages from it. M. Sanson (*Bull. de l'Acad. Roy. de Méd.*, t. I., p. 877) also used this method in one instance with success, in a woman who had been delivered, and in whom there was a fibrous polypus in the womb as large as the fist. A similar instance was met with by M.

Bréon, who showed me the tumor in 1835. M. Magistel was astonished to find in a woman whom he had just delivered, a mass in the uterus larger than the fist. We found after death, which resulted from peritonitis, that the case in question was one of an enormous fibrous polypus. Many of these polypi, moreover, are very easily extracted. A lady of Mans, whom I had seen, went to consult M. Récamier, who removed her polypus with his finger nail. In another case, the polypus, which was of the size of a large nut, and situated in the interior of the neck, was detached by means of tractions and simple frictions with the speculum. I have torn them out in several instances, even from the cavity of the womb, by means of my finger. In a woman who had just been delivered for the fifth time, M. Stoll (*Gaz. Méd.*, 1839, p. 186) found in the vagina a polypus ten inches long, and weighing a pound, and which he was enabled to detach from the uterus by means of his nails. In the mother of a young physician, I was enabled by means of my finger to detach and remove a polypus as large as the half of an egg, though it was situated in the cavity of the uterus itself. To effect the arrachement, we grasp the body of the polypus with the forceps of Museux, with the ordinary tenaculum, or with the fingers if it is not very large, or with a straight or curved forceps. We then make regular tractions, either simple, or combined, with slight movements of rotation, until we have brought the tumor outside. It is scarcely except at this stage that it would be practicable to make use of the precaution of Hevin, but there would be no longer any object in doing so, for if we did not at this moment wish to have recourse to pure and simple excision, nothing would be more easy than to apply a ligature on the most contracted part of the morbid mass, and then to excise the latter immediately below it. I have been enabled in three instances to tear out small mucous polypi, situated in the neck of the uterus, by means of the polypus tenacula, guided upon two fingers of the right hand.

#### § IV.

M. Récamier, who considers that these bodies may be destroyed not only by arrachement, but also by *breaking them up (broiement)*, has published two cases in support of his assertion. In one the polypus, which was of the size of the great toe, was implanted into the upper part of the neck, and projected into the vagina. Having made strong pressure upon it with the forefinger of his right hand, this physician succeeded in dividing and reducing it into a pulp, and was enabled to accomplish its extraction in less than two minutes; in the other, finding it impossible either to tie or extract the tumor, it was ruthlessly broken up by means of the erigene forceps or fingers, and reduced into a sort of packthread, the filaments of which constantly slipped between the prongs of the instrument. I cannot understand the advantages of a process of this kind, and have no remark to make upon it.

#### § V.

The *ligature* to uterine polypi is a much more ancient process than Levret has alleged. It is evident that Aetius and Moschion were

acquainted with it, and Philotenus before them. It must be admitted, however, that we are indebted to Levret for having introduced it into practice in modern times, by demonstrating that it is applicable not only to polypi that protrude from the vulva, but also to those which are placed at the highest point in the genital cavity. Numerous instruments have been contrived for performing this operation. All those used for tying polypi of the nose are applicable to it. The two tubes united in the form of a forceps, and which in the beginning were much extolled by Levret, also those that Theden had constructed upon the same model almost, together with the instrument of Lecat and that of Herbiniaux are now abandoned, nor do I think that the ligature-holding and knot-tightening forceps of M. J. Cloquet, which scarcely differs from that of Theden, will continue to be any longer used. Nor has the double canula of the first named author been any longer retained in practice. The two separated canulas of Desault or the catheters of Niessen have been substituted for these. Every thing leads us to believe that the modifications proposed by Clarke, Laugier, Loeffler and Cullerier, as well as a great number of others mentioned in the treatise of M. Meisner, will also be rejected from practice.

A. *Operative Process.*—The instruments being prepared, the following is the manner in which we should proceed.

I. The operator having ascertained the position of the polypus and the dimensions of its pedicle as correctly as possible, adjusts the ligature which he intends to use, which should be of fine silver, according to the *notions of Levret*, but which is now more generally made of silk or linen thread, taking care only that it shall have sufficient strength. If we make use of the two canulas of Levret, we adjust the thread in such manner that it may form a noose on one end, and be fastened at the other upon the ring which is found external to the shoulder of each canula. One or two fingers of the left hand, introduced as high up as possible, will serve to guide the whole to the pedicle of the polypus. The surgeon then immediately takes one of the canulas in each hand ; fixes at the same point the one on which the ligature is fastened below ; then makes the other pass around the circumference of the pedicle until he has been enabled to cross them ; then twists and turns them together on their axis ; detaches the ligature from them ; withdraws them ; and then passes the two united extremities of the ligature through another tube, which is called the knot-tightener, and which enables him to strangulate the tissues with all the force required.

II. *The instruments of Desault* differ from those of Levret in this, that the two ligature-holders are separated and free, like those of David, and also in one of them when shut containing a sort of forceps which terminates in a beak or bird's eye. Half the ligature is first passed into the simple canula and fastened below on its ring ; the other half is then embraced by the forceps, which is closed by withdrawing it into its canula, and which latter has on its lower part a notch to secure the second end of the ligature. The apparatus is then introduced in the same manner as before at the part which presents the least resistance. Having reached the pedicle, the operator with his left hand holds the simple canula immovable, grasps the for-

ceps-holding canula with his right hand, makes it pass around the entire circumference of the tumor, and brings it back on a line with the other in such manner that the ligature forms a complete circle upon the pedicle which is to be strangulated. The forceps pushed through its canula opens and lets the thread out, and may be removed without displacing it. The extremities of this ligature united into a single cord, are then inserted through the opening of another metallic piece some inches long and cleft at its external extremity, and the head of which, which has an eye, is bent almost at a right angle upon the body of the instrument. This knot-tightener enables us to regulate the constriction in such manner as may be desirable, and to augment or diminish it according to the indication presented. It is then to be finally attached by means of a thread upon one of the sides of the vulva, after having protected the instrument with lint or linen.

III. *The apparatus of M. Niessen* is composed of two long curved silver canulas, which may be flexed or straightened at pleasure, and which serve as the ligature holder. When they have arrived at the polypus, they are both inserted into a third canula, which latter is divided into two tubes by a partition, and is only an inch or two long. This last, which seems to be nothing more than a portion of the double tube of Levret, is conducted as high up as possible, from below upwards, first by means of the fingers, and then with the extremity of a hook sound. Its object is to strangulate gradually the pedicle of the tumor, by forcing the upper extremities of the two first canulas to approximate each other without losing their parallel direction.

IV. We can scarcely understand at first sight, what advantage there would be in giving the preference to these instruments over those of the French practitioners. The canulas of the German author being no other than those of Levret slightly elongated and curved, might possess some advantage perhaps, when we have to penetrate to a great depth; but the double tube intended to approximate them, appears to me infinitely less adapted to attain this object than the knot-tightener contrived by Desault. If, moreover, we wished to modify this last part of the apparatus, the chaplet of M. Mayor would be decidedly preferable, and better even than for the nose. If, in order to strangulate the polypus by means of this chaplet, we could not command the mechanical addition of the winch which the author uses, nor the little instrument of the same kind, invented by M. Levannier, (*Arch. Gén. de Méd.*, t. XI., p. 467,) we might succeed very well by tightening the two halves of the ligature upon a piece of cork, or any other solid substance. The jointed knot-tightener, which Bichat was desirous of substituting for the forceps-canula of Desault, as it is incapable of carrying out the intentions of the author, except in a few rare cases, is worthy of no further remark. Nor do I think that the knot-tightener of Ansiaux, (*Clin. Chir.*, 2nd edit., p. 285,) or the speculum of M. Guillot, as modified by M. P. Dubois, so as to serve as a ligature holder, nor the seven pieces which enter into the instrument of M. Lasserre, (*Arch. Gén. de Méd.*, 2nd ser., t. V., p. 153,) are calculated to throw into oblivion the apparatus of the ancient surgeon of the Hotel Dieu, which is so simple and ingenious.

V. When the ligature is properly applied, the circulation and vitality of the part below it soon cease. While the mortification of the polypus is going on, the ligature little by little cuts through the pedicle. It is easily conceived, moreover, that the ligature will divide the root so much the more speedily, according to the force of constriction employed, and the density, resistance and volume of the tissues. So long as the pedicle does not exceed in thickness the diameter of an inch, a single ligature properly tightened will suffice to cut through it in the space of a few days; but it has been considered when it exceeds this diameter, that it would be advantageous to perforate it by means of a needle with a double ligature, in order to strangulate its two halves separately. This is a principle to which in the first place, two objections may be made: 1. Those polypi which may be brought out to the vulva, and which are the only ones which are adapted to this process, rarely have a root so large as to require this precaution. 2. Those which have a larger pedicle, whether they may be brought out or not, are all of them fibrous bodies, which are to be detached by means of the cutting instrument, or they are vegetations of a bad character, which are not to be meddled with. Enormous polypi, however, have been removed by means of the ligature. Richter, of Moscow, (*Synopsis Obstet.*, &c., p. 114,) has succeeded by this means, though the tumor weighed four pounds and a half.

B. Among the ligature-holding instruments which have been proposed, those of M. Mayor appear to me to be especially worthy of being made trial of. These consist of two elastic steel rods, or even of whalebone, should we not have time to procure those of metal, and are terminated in crabs' claws. The ligature is adjusted in the same way as in the forceps of Desault, and is to be applied around the polypus with the same precautions. All that is required to disengage it, is to draw with some force upon the conducting instrument, as soon as the knot-tightener has reached near the pedicle to be strangulated. With the double tube of Levret, the two portions of the ligature are brought too near the polypus, to allow of its sliding with ease when we wish to augment the constriction. The same remark nearly applies to all the knot-tighteners. To introduce the ligature down to the root of the polypus, astraddle the left forefinger, while with the right hand we bring its two halves out in front, as some person (*Gaz. Méd.*, 1832, p. 720,) has recommended, would succeed only in some rare exceptions. Embarrassed, like so many others, by this inconvenience, M. G. Pelletan, with a view to avoid it, has caused to be constructed an ingenious apparatus. Being slightly separated apart, in the manner of a fork, to the distance of some lines, the two branches which terminate the inner extremity of his knot-tightener, are applied on their concavity against the root of the polypus, and scarcely deviate the direction of the thread, with the circle of which they are in some sort continuous. A spring, or kind of steel band, curved in several directions in order to increase its elasticity, being placed at the outer extremity of the instrument, receives the other end of the ligature, and constantly augments the constriction. The *elastic instrument* moreover, may be combined with all the other contrivances, and among others with the chaplet of M. Mayor. As to the bifur-

cation of the knot-tightener, it would be attended with no inconvenience, unless we wished to turn it on its axis in order to twist the ligature.

C. Before *strangulating a polypus* which hangs outside, it is important to remark, that its pedicle might possibly be formed by the fundus of the everted uterus, and that it would be dangerous in that case, to place the ligature on too elevated a point of the tumor. The *decomposition* of a polypus in the sexual organs, sometimes involves consequences which we should be fortunate if we could avoid. Thus, the offensive odor which attends it is exceedingly disagreeable, both for the patient and for those who are about her. When the polypus is of a very large size, and the temperature of the weather very elevated, this odor in fact may be so excessive as to be insupportable. The putrilage, moreover, which results from it, irritates the vagina and vulva, and may, if it is absorbed, give rise to infection of the whole system, or to a fever of bad character. Should it be found impossible to bring the tumor to the outside, we must content ourselves with combatting these inconveniences by means of the ordinary cleansing resources, by simple injections with mallows or sweetened barley water, those of decoction of bark, or what is better, with solutions of the alkaline chlorurets; but when the pedicle is very low down, or when by means of moderate tractions we can make it descend without occasioning too much pain, it is more expeditious, and certainly less dangerous, to excise the whole mass below the ligature than to leave it to itself. M. Demazière de Bergues, (communicated by the author, August 16, 1837,) by operating in this manner, after having made use of the forceps to depress a polypus of two pounds and a half in weight, in a woman 41 years of age, succeeded perfectly.

D. Levret has contended that *after the ligature*, the mortification extends to the union of the polypus with the uterus, even though the constriction may have been made a little below, and that these tumors, when once strangulated, almost always become detached at the same point as the umbilical cord does in the infant, whatever may be the part at which the ligature has been applied. This idea appears dangerous to Boyer. In fact, if it were erroneous, it might involve serious consequences in practice. If we adopted it, it would be a matter of little consequence whether we applied the ligature exactly on the upper part of the pedicle or at some distance below. Now, as it is generally more easy to apply it lower down than higher up, and as some persons, moreover, might be fearful if they adjusted it higher up, that they might wound some portion of the tissue of the uterus, the ligature would in many instances be placed in such manner as to leave a portion of the polypus in the organs. If on the other hand it be true, as Boyer affirms, that vitality does not cease in the tumor, except in the part below that which is embraced by the ligature, this latter, if we do not wish to run the risk of a return of the disease, ought always to be applied upon the most elevated point of the morbid production. The opinion of Levret is based upon facts, and M. Genseul has defended it by adducing cases in support of it. Moreover, from what we know of the laws of the organism, there is no reason

why this process may not be compared to what takes place at the time of the separation of the umbilical cord. All that is requisite is, to understand ourselves on this point. The mucous polypi, or those in which numerous vessels are distributed, and which are evidently continuous with the tissue of the uterus itself, are not compatible with the theory of Levret, which in my opinion is applicable only to those which constitute actual foreign bodies in the midst of the organs, or still more to those polypi which are purely fibrous or lardaceous, and which are destitute of any appreciable vascular circulation. I have seen more than an inch of the root of a fibrous polypus come away a long time after the separation of the ligature, and putrefy in two other cases to a considerable distance beyond the point where it was excised. This phenomenon is so much the less surprising, from the fact, that *certain polypi dissolve*, and ultimately disappear spontaneously in the womb. A fibrous body of the size of a nut, which I had ascertained to exist in the neck of the uterus, could be no longer found at the expiration of six months, though nothing had been expelled from the genital organs. If it should be objected, that I might have been deceived in this case, I would add, that in a woman who came into La Charité in August, 1838, to be operated upon, the polypus gradually disappeared under our eyes, and that the patient having died of peritonitis, we were enabled by the autopsy to detect the root in the body of the uterus itself. Dugès and Mdme. Boivin, moreover, have noticed similar facts.

### § VI.—*Excision.*

The ancients, more daring than surgeons of the last century, frequently had recourse to excision of genital polypi. Philotenus, Aetius, Moschion, &c., evidently had reference to this method when they recommended the removal by means of the cutting instrument, *of varicose or hemorrhoidal excrescences of the uterus.* F. ab Aquapendente made use for this purpose of cutting hooks, which he has greatly eulogized, and the extremity of which made in the manner of scissors, exempted him from the necessity of previously drawing the polypus to the outside. Though the attention of practitioners has been occasionally directed by authors to the subject of excision, and that Tulpus, (Bonet, *Corps de Méd.*, t. IV., pp. 29, 31,) Water and Fronton, the latter cited by Levret, relate cases in its favor, it has nevertheless not yet succeeded in triumphing over all prejudices. Boyer, who states that he employed it in one instance with success, and who does not appear to be disinclined to yield it the preference, does not, however, venture to formally recommend it as a general method. The objection to it is that it exposes to hemorrhage and to the danger of wounding the rectum, bladder, vagina, and even the womb, and that it is a more difficult process than the ligature. The wound itself which it must necessarily occasion, has alarmed many surgeons, who apprehend that inflammation may be thus produced in the uterus, or that there may ensue a suppuration or an ulcer, which it would be found difficult to cure. The investigations and dissections which I have had it in my power to make, and which are in accordance with those undertaken by M. Hervez de Chégoine, have demon-

strated to my satisfaction that fibrous bodies, properly so called, may be excised without the slightest inconvenience. In no cases, in fact, are they adherent to the uterus by a pedicle containing large sized vessels. The layer of the uterus, usually very attenuated, which serves as their investment, is nothing more than a simple envelope, which we have nothing more to do than to incise to effect the enucleation of the pedicle with great ease, either by means of the fingers or the handle of a scalpel, in the same way as if it were a lipoma or sub-cutaneous cyst. As to homogeneous, hard grayish tumors, which are continuous with the tissue of the uterus, the section of their pedicle also is not of a nature to give rise to any dangerous loss of blood, if I may judge at least by those which I have met with in the dead body, or which I have had occasion to remove during life. Nor, in the third place, can I conceive why fibrous masses caused by a partial hypertrophy of the organ, should be calculated to give rise in this respect to the slightest apprehension. It is also difficult to comprehend how the removal with the cutting instrument of those small mucous soft tumors mentioned by M. Bérard, and which I have several times successfully extirpated, or how any other polypous growth which can be attacked by the ligature, could any more in reality give rise to a dread of this accident. There are, therefore, no other tumors than those reddish bleeding vegetations, occasionally painful, but rarely pediculated, and which have been mentioned above, which might render excision improper; but the ligature to them scarcely answers any better purpose, for we have to rank these among those unfortunate diseases which nothing can relieve, and to which may be applied with too much justice the designation of *noli me tangere*. Dupuytren excised all the uterine polypous tumors which he was called upon to treat, and in one case only did the flow of blood appear to him so considerable as to require some particular attention: M. Hervez de Chégoïn relates numerous facts which are full as conclusive. M. Villeneuve, M. Lejeune, and a great number of other practitioners have also published various operations of the same kind, which have been no less successful. In Germany MM. Siebold and Mayer have published a memoir which proves that excision, which had been long since adopted by them in the hospitals of Vienna, has been attended with successful results of the most remarkable character. Finally, I may be permitted to add that out of twenty operations for polypus, which up to the present time (April, 1839) I have had occasion to perform with the cutting instrument, not one of them has occasioned the slightest disturbing hemorrhage.

A. *Operative Process.*—The articles consist of one of Museux's long forceps, an ordinary bistoury or simple scalpel, together with lint, certain astringent preparations in case of necessity, and also linen as in other capital operations. If, however, the tumor should be of large size other instruments might be required; such, for example, as forceps, sharp hooks, or, as I have sometimes used, long and strong double erigines, somewhat curved, in order to accommodate themselves to the form of the parts.

I. In *ordinary* cases, the right hand introduces the forceps, shut up, into the vagina, and does not open them to grasp the tumor ex-

cept so far as the fingers of the left hand protect and direct their hooks. By means of gentle tractions, judiciously made, the morbid production is then gradually made to descend. If the mobility of the uterus is such as to enable us to bring out the pedicle with ease, its section may then be readily made by means of any cutting instrument whatever, while an assistant carefully holds open the lips of the vulva. When, on the contrary, the polypus does not yield, the surgeon, without allowing it to ascend, must proceed with the point of a straight bistoury, to divide it at its most contracted portion, always following the instrument with the fingers of his left hand, which should be kept in the vagina. I had occasion, in a young lady, to operate for a polypus as large as a turkey's egg, which was planted on the interior of the neck, and which, after having got down as far as into the vulva, appeared to be disinclined to descend any more. While M. Cottereau, physician of the patient, retained it in the pelvic strait, I introduced the fore and middle finger of the left hand to the os tincæ, and then, with the right hand, I glided in, as high as the upper part of the vagina, and between the polypus and my fingers, a bistoury wrapped in linen, and by means of which I readily detached the tumor. Not a drop of blood flowed, and this lady might have resumed her usual occupations on the third day after.

II. If the polypus, on account of its size, should prevent our proceeding in this manner, we might make use of a bistoury slightly curved flatwise, or a pair of scissors of the same form. In cases where it might appear to be dangerous to make tractions on the womb, the species of forceps terminated by a strongly curved extremity and slightly notched, and having a cutting edge like the tenaculum of J. Fabricius, and which has been used by Lobstein in more than one instance, would prove a valuable resource. It was with the same object in view that M. Mayer contrived long and strong scissors, curved in the shape of an S, by means of which he could detach the tumor at whatever height it was situated. The scissors, however, made use of by Boyer and Dupuytren, which are equally long and very strong, and which have only a simple concavity on one of the sides of their blades, would accomplish the same result full as perfectly. They have, moreover, another advantage, viz., that of detaching the polypus little by little from the walls of the vagina when it has contracted adhesions with them, and before we bring it down and divide its pedicle, as would have been required in the case noticed by M. Bérard, (*Arch. Gén. de Méd.*, t. II., p. 88,) as the tumor here was attached to the vagina by one of its roots and to the interior of the uterus by the other.

III. If the tumor should not be *separated* from the organic wall upon which it has originated *except by a groove*, in place of having a pedicle, and if this body were fibrous, we must not, on that account, suppose ourselves obliged to carry the instrument into the deepest part of the groove. In such cases, in fact, provided we incise a little above the greatest diameter of the polypus, and can give a certain extent to the incision and divide the entire layer of natural tissue which envelopes the morbid production, nothing more is required to enable us, by means of the fingers, the handle of the instrument or simple tractions, to detach the tumor in the same way that we

would separate a kernel of fruit from the parts which envelope it. The flaps which are left by this enucleation, either retract and cicatrize by shrinking upon themselves, or are in part destroyed by means of the suppuration.

IV. Uterine polypi are sometimes of *so large a size* that they completely fill up the whole of the vagina, and even ascend as high as into the hypogastrium or iliac fossæ. Baudelocque states that he saw one whose lower half occupied the pelvis, while the other made a marked projection above the upper strait. He was enabled to strangulate the first portion; but when it had separated, Louis was not willing that they should attempt to reach the other with the forceps. The woman died, and Baudelocque asserts that it would have been practicable to extract the second portion of the foreign body full as well as the first.

It is for cases of this kind that the same author recommends the use of the forceps, which Herbiniaux had employed before him with entire success. Since that period, it has been used by M. Deneux, Murat, and M. Hervez de Chégoïn, with all the benefit that Baudelocque had anticipated from it. At the present time, when we have quite correct ideas on the nature of these large sized polypi, we could undertake their extraction with so much the greater confidence, from our not feeling ourselves any longer under the necessity of having recourse at the same time to the ligature. After all, the forceps is not the only instrument, nor is it always the best which would be indicated in such cases.

V. In the month of September, 1830, I was sent for to Bergues, by M. De Mazières, to attend a lady who had an enormous fibrous tumor of the womb, and which made a projection above the pubis and filled up the vagina. Though resistant and very elastic, it could be so easily depressed that the prongs of the forceps constantly tended to slip either in front or behind. I preferred grasping its apex with Museux's long forceps, and then applying two strong erigines with double hooks above its thickest portion, one on each side, and plunging them deep into its tissues. Being thus grasped by four points at the same time, it was gradually brought down into the lower strait by means of well regulated tractions. The perineum, which had to be incised posteriorly, resisted for a long time, but finally, ascertaining with my forefinger that the pedicle of the polypus was powerfully stretched, I directed upon it a straight bistoury wrapped in linen, when an incision of a few lines enabled the elasticity of the parts to complete the operation; no hemorrhage took place, and notwithstanding the marasmus and exhaustion to which the patient had been reduced, her health has been completely re-established. I have operated with the same success in a case in every respect similar, and who was a patient of M. E. Moulin. In another woman the polypus was so voluminous that I could not in any way bring it to the outside. M. Chassaignac suggested to me the idea of removing a thick cut from it in the same way as we would a slice of melon. Having thus brought it down I detached it in the same way as in the preceding cases. There are cases however where the tumor is so situated that nothing appears capable of depressing it. A woman 36 years of age, was sent into my department at the

Hospital of St. Antoine, by M. Kapeler. Her tumor filled up almost the entire pelvis, and formed a considerable projection above the strait. M. Marjolin, M. Kapeler and myself, decided that we would endeavor to extirpate it through the natural passages. I grasped it three times with an ordinary forceps, and three times my efforts to make it descend proved unavailing. Being then apprehensive that I would unnecessarily aggravate her sufferings, I deemed it advisable to abandon the patient to the natural consequences of her disease. She died at the expiration of some months. At the autopsy, we found a fibrous body without any pedicle, and mostly transformed into putrilage, and having its root in the tissues of the left wall of the neck, from which moreover it could easily be detached after having incised its layer of natural tissue. Another tumor, which was as large only as the two fists, and united at one of its sides with the preceding, occupied the right side of the uterus, and was also found enveloped by a thin layer of this organ. These two masses, whose base was almost as large as their greatest diameter, and which were of larger size above than below the strait, could not be grasped with sufficient firmness by the forceps to enable us to depress and remove them; but the dissection proved to us, that notwithstanding the apparent extent of their adhesions, their excision by *enucleation* would have been practicable, if by any means whatever we could have made them descend to the lower strait, or could have applied the bistoury upon any point of their circumference.

VI. As these descriptions of polypi cannot be lacerated but with much difficulty, it would be advantageous, when we have succeeded in making them protrude at the vulva, to insert through them, by means of a long *curved needle*, having a handle and pierced near its point, a strong ligature of waxed thread, which should be shaped into a noose, and which would enable us to make traction upon them without causing as much embarrassment as the other instruments. When the tumor is of an equivocal character, or when it should appear practicable by seizing it with a forceps to make it descend so far as to enable us to pass our finger around the pedicle, or when, as in the cases cited by Levret and Eschenbach, we perceive arterial pulsations in this pedicle, or when, notwithstanding what I have said in the remarks above, the hemorrhage might still be calculated to produce alarm, there would be nothing to prevent us from applying in the first place, before making the excision, a ligature as high up as possible, as is recommended by M. Mayer, and as has been practised by M. Demazière.

VII. *If the tumor is still entirely enclosed in the womb*, and if we have been enabled to satisfy ourselves that it is alone and that no others exist in the tissues of the organ, beyond the aid of surgical resources, we may still quite frequently have it in our power to reach it. To secure the neck of the uterus by means of a number of Museux's forceps, to depress it, and to enable us more readily to explore, grasp, and remove the polypus, is a pernicious practice, which would be not worthy of being mentioned, if a surgeon of Paris had not conceived the idea of giving it the preference over every other. It is infinitely better in such cases to imitate Bonnie, and to dilate the parts at first before disengaging the polypus, or even to effect the debride-

ment of the neck on one or several points, as Dupuytren has done in some instances.

VIII. *Process of the Author.*—I feel moreover satisfied that a good pair of erigne forceps, guided by the finger, will almost always succeed in such cases without any great degree of difficulty, in embracing the head of the polypus, whether the debridement should afterwards seem to be indispensable, or whether the finger may in the first place reach the root of the tumor; I apply as high up as to this part, either the long curved scissors, or the blunt knife, which is also curved. Supporting the forceps with the finger, while an assistant makes gentle traction upon them, I am enabled to detach the polypus without any difficulty. I was enabled in this manner, with M. Pailloux to assist me, to remove in 1837, from a lady, an enormous fibrous mass which had passed into a state of putrefaction in the uterus. In adopting the same method, I excised without difficulty at La Charité, in 1836, 1837, and 1838, a sarcomatous polypus of the size of a nut, afterwards a fibrous polypus, which was yet still less, and finally a polypus as large as an egg, in three different women. This is a method, moreover, which I also apply to polypi which have escaped from the neck, and which may be seized in the vagina. A patient of M. Dufrenoix, and several patients of the hospital, were operated upon in this manner without the slightest difficulty. As we are enabled by this process to avoid all tractions upon the uterus, the operation is thereby evidently rendered less painful and less dangerous.

B. *Subsequent treatment.*—After the excision, the treatment required by the patient is confined to injections, which are first emollient, then detergative, and finally slightly desiccant. If contrary to all expectations a hemorrhage should supervene, astringent injections or pledgets of lint saturated with oxycrat, eau de Rabel, or solution of alum, or sprinkled with colophane or any other styptic powder, would, as I conceive, speedily arrest it. Tamponing also would be a last resource, which must not be omitted after having in vain made trial of other means. The cure is usually rapid, and the woman is sometimes re-established in less than 15 days. But serious and even fatal accidents may also result from the excision of a polypus, however small it may be. A lady had one of the smallest description. She was operated upon and death took place three days after. Assisted by M. Cartault, I excised one which did not exceed the size of a cherry, but the patient nevertheless died of peritonitis in eight days. A fatal hemorrhage closely followed upon an operation of as trivial a character in a case which has been related to me by M. Marjolin. In two instances I have seen serious symptoms of phlebitis or of suppuration in the pelvis, after the removal of a polypus from the uterus. As a general rule, however, it is one of those operations in surgery which succeed the best.

#### [POLYPI OF THE UTERUS.]

One of the most important circumstances connected with *fibrous polypi of the uterus*, growing upon the fundus of the womb and within that organ, is the difficulty attending its *diagnosis from preg-*

nancy, or *prolapsus*, or eversion of the uterus when the tumor is very large. It then, as is remarked by Dr. Bullen, in an excellent memoir on *Polypoid growths of the uterus*, (*Dublin Med. Journ.*, vol. XXV., 1844, p. 407, &c.,) occupies the whole of the womb. In a remarkable case of this kind in a woman aged 50, labor pains and hemorrhage came on, and the tumor having descended into the vagina was returned by the midwife, on the supposition that it was a prolapsus of the uterus. Its appearance, according to Dr. Bullen, was in many respects similar to a prolapsed uterus. It may be mistaken for a prolapsed uterus when the tumor has only partially descended into the vagina or to the vulva, because not only its general shape naturally corresponds to the cavity which it fills, but also the mucous membrane which lines it, being continuous with that of the uterus, presents in a morbid state the same aspect as the latter. For example, it is extremely vascular, and several large veins filled with blood can be distinctly seen ramifying through it, while upon the surface are irregularities, and also a *marked indentation* that give it quite the appearance of the *os tincæ*. The deception, moreover, of an *impregnated uterus* will be added to this misapprehension when the polypus is replaced in the vagina, as the tumor is then felt in the hypogastrium above the pubis, of the size and shape of the womb in the sixth month of pregnancy. But when the polypus drags down and inverts the uterus by its weight, that is, turns the latter inside out and brings it completely without the vulva, a mistake can no longer exist, as we should think, because then the counterfeit *os tincæ* still remaining, would manifestly prove that the uterus itself could not have *prolapsed* to so great an extent; while the attachment of the polypus to the *everted* fundus would also then be necessarily defined in a clear manner. To make a correct examination, Dr. Bullen recommends Prof. Simpson's *uterine bougie*, to be passed up between the uterus and tumor, taking care first to replace the uterus *in situ*.

The tumor in the case in question was brought as far as convenient without the vulva, when a ligature was placed around its broad base, close to its attachment to the fundus of the womb. Forty-eight hours afterwards, in consequence of the dangerous reaction, pain, abdominal tenderness, offensive discharges from the vagina, &c., it became necessary to proceed immediately to the *delivery of the tumor* by Levret's forceps, and before the ligature had had time to cut its way through it. To meet this difficulty *torsion* was used with the forceps to a very considerable extent, by which means the polypus was brought away. It was fibrous and *larger than a child's head*, and weighed nearly *two pounds*. An immense quantity of fetid liquid, which had been pent up, was thus also enabled to come away, which gave great relief. The ligature on the remaining neck of the polypus came away two or three days afterwards. Though it is not so stated, the inference is that this patient recovered.

In remarking upon this case and treatment, Dr. Bullen judiciously points out the necessity of forcibly abstracting the *tumor by torsion*, as above described, as soon as there are any manifestations of the dangerous description mentioned. The retention of the natural mucous and sanguineo-mucous discharges of the uterine cavities

and passages, must necessarily endanger their absorption, which is the chief thing to be dreaded, and much more so than the immediate inflammation radiating from the place of the ligature. Cases in proof of this are given, and one (*Provincial Journal*, 1844) where the polypus being left in the womb, caused engorgement of the fallopian tubes with pus, suppuration and gangrene of the tissues near the right ovary, sloughing of the uterus, adhesions of the peritoneum, and, in fact, all the local and constitutional phenomena of typhoid fever and uterine phlebitis in their most formidable shape. The polypous tumor was never abstracted, and lay loose and detached in the vagina, being the twelfth day from the operation.

Dr. Bullen points out another very important circumstance in connection with the difficulty of the diagnosis in these polypi. Thus the *investing membrane* of the tumor, by the deposition of coagulum lymph, will be found to have become closely adherent to the lining membrane of the dilated uterus itself, as well as to portions of the vagina, with which it may be in contact. This state of things may still more strongly incline the surgeon to suppose at first that the disease in question is in fact a *prolapsed uterus*; and should the tumor slough and separate, a more gross delusion may arise, and lead to the supposition that it is the *uterus itself* which has been detached. The great purpose of the ligature to polypi in the uterus, is, as we perceive, not to wait for its action until it has cut through the enormous pedicle, but in order to prevent hemorrhage when we proceed to extract the tumor by *torsion*. As an evidence of the danger of hemorrhage, in immediate excision of uterine polypous tumors, Dr. Bullen instances several in which he has seen it occur after snipping off merely those forms of this tumor which are cystic, and united merely by a slender pedicle to some part of the lining membrane of the cervix uteri, of which membrane these cystic polypi, which are filled with a gelatinous fluid, appear to him to be nothing more than a sacculated prolongation or hypertrophy. The *actual cautery only*, he says, will arrest the hemorrhage, but this is what will scarcely be permitted by the patient.

There is a third description of polypi of the uterus, which are *malignant*, and terminate fatally, and yet are not, in Dr. Bullen's opinion, cancerous. These are what he terms *malignant, granular, or tuberculous polypi*, sometimes called the *cauliflower* polypus, and which are distinguished by their great vascularity and tendency to profuse hemorrhage, producing great exhaustion, but unaccompanied with pain. In their ultimate development, they assume all the characters of Carmichael's *malignant parasite*. Yet they are totally distinct, Dr. Bullen says, from true *carcinoma* of the uterus, in which latter no one can mistake the peculiar well-known acute, hot, and lancinating pains, and finally the terrible, though slow destruction of parts from the rat-bitten-like, jagged ulcerations, &c. Nevertheless, these *cauliflower* forms are frequently hereditary, or at least connected with a constitutional *diathesis*. Thus he knew three *married sisters* of a highly respectable family near Cork, (Ireland,) who all successively died of this hemorrhagic form of polypus, on reaching the age of 43 years. Two of the three had children.

In another, an extreme case of this kind, in a married lady, aged

30, Dr. Bullen, from the painful and distending pressure made by the growth of the tumor, which finally filled up the entire uterine cavity, and thus of itself arrested the hemorrhagic discharges, was obliged to have recourse to the silver wire ligature, applied through the canula. He thus brought away a basin full of the morbid growth, but it was at the sacrifice of an immense and dangerous loss of blood. The surface of the substance was rough and granular, and its texture very friable, and easily rubbed down between the fingers, showing a reticulated appearance like sponge. It would be well, as we think, in such cases, always to ligature a small portion at first, and bring it away, were it only to aid the explorations and diagnosis. Dr. Bullen remarks that there were also lobulated aggregations of small whitish opaque bodies, manifestly tubercular, thickly scattered throughout the extent of this morbid mass, and interspersed with distinct cavities containing transparent hydatids. The size of the mass was greatly reduced by its removal, showing that its great bulk was chiefly owing to the quantity of blood which it contained. However, this distressing disease again returned, and she sunk from loss of blood, both her mother and aunt having died with the same affection, before they reached the age of 40. Whatever be the name given, we cannot but look upon such forms of *polypus*, if that generic designation in fact be admitted, as purely of the *fungus hæmatodes* character, such as are found in the breast and other regions. The appearance of hydatid cysts and encephaloid deposite in the so-called cauliflower polypi, when they have reached their ultimate degenerescence, does not make it necessary to exclude them from *fungus hematodes*, for however old fashioned this word, its import is well understood, and such bleeding, hypertrophied, and almost painless tumors, are much easier recognized by these familiar epithets, than by any presumed analogies to the more vague descriptions of disease known under the names of *erectile tumors*, or *vascular sarcoma*. Dr. Bullen, however, contends also that these carcinomatous polypi differ in toto, as they doubtless do, from the *florid warty vegetations*, which are often seen upon the external lip of the cervix uteri accompanying obstinate leucorrhœas and certain forms of syphilis. [Rather say, mercurialized syphilis. T.] Dr. Bullen considers this form of polypus as decidedly malignant, but as not necessarily requiring *carcinomatous ulceration* or symptoms of true cancer to make them fatal. In the beginning, excision of the neck of the uterus, as this is their special locality, might answer; but then the disease is so insidious that it is completely marked by (i. e., confounded with) menorrhagia. In considering the point, whether in their advanced stage *excision of the uterus* would be justifiable, Dr. Bullen is averse to it under almost any circumstances, and naturally reverts to the fact of the danger of such an operation, and the growing *aversion* to the employment of the knife as a curative agent in any form of malignant tumor. Certainly experience has given us too much reason to distrust its value under such circumstances, especially when we reflect that daily accumulating observations go more and more in confirmation of the ancient opinion, that *malignant tumor* depends on a *constitutional malignant diathesis*, always existing, but developed at a certain period; or as Dr. Bullen says, "growths, essentially malignant

are malignant *ab initio*, or from their first development in the system." *A fortiori*, we would say to this surgeon, that we are carried back for our only refuge here, as well as in various other departments of the art, to *conservative surgery* and the *medical treatment* of local as well as constitutional affections, hitherto deemed to have been the monopoly of the scalpel.

Dr. Bullen also quotes the recent report of Dr. Regnoli to the Scientific Congress of Italy, to show that the *average duration* of life is longer in such cases, where they have been *let alone*, than where *extirpation* or the knife has been appealed to. For out of 250 in whom cancerous formations had been extirpated by the knife, scarcely *twenty* had survived three years.

The discussion on tumors at Paris, which we have elsewhere given at length in this volume, (see supra, under *Tumors*,) also all resolves itself into this one great conclusion, from which there has been but little dissent. Of this result M. Cruveilhier, who first led off in this important investigation, has much reason to be proud, when he reflects how great an acquisition this unanimity has already brought to *conservative surgery*, and to the shielding of *human* life from the inhuman mutilations of the knife in the hands of reckless and ignorant persons.

Dr. Lever of London (*Practical Treatise on Organic Diseases of the Uterus. &c.*, which received the Fothergillian medal in 1843,) has found, contrary to the general remark, as many uterine polypi that were *sensitive*, as those that were not so. He considers both polypi and fibrous tumors, which he makes distinct, more frequent in *unmarried* than in married persons.

Mr. H. Oldham (*Guy's Hospital Reports*, April, 1844) has been surprised to find, that on injecting *ordinary pediculated fibrous polypi of the uterus*, the *arteries* were not only of large size, but far exceeded in their number that of the veins in the tumor. The abundant hemorrhages which such polypi frequently occasion, especially where they are complicated with pregnancy, when they may lead to dangerous mistakes, is thus easily accounted for. The *uterus itself* has been ligatured for a large polypus, and thus actually *excised*! Mr. Rigby informed Mr. Oldham of a case in which a fibrous polypus was tied, when on the following morning the *surgeon* finding another tumor above his ligature, also tied that. After the separation of this supposed second tumor, a cicatrix was found above at the upper part of the vagina, but the womb was gone! Polypi consisting of *small cysts*, containing viscous matter, are, Mr. Oldham thinks, abnormal developments of the ova of Nabothe, or of uterine follicles. To these follicles in the neck of the womb he also ascribes a new form of uterine polypi, which he calls *canalicated*, having a number of elongated canals running through their substance and opening by quite large orifices on their surface. Most polypi he considers disconnected in their origin with organized clots of blood, but as growths from the substance of the uterus itself. When polypi in the womb, by their hemorrhage during parturition, give rise to apprehension, they are to be ligatured or exsected immediately.

M. L. Boyer (*Arch. Gén.*, May, 1844) recommends a new knot-tightener, or rather *sawing ligature*, for exsecting polypi of the

uterus. He calls the process *sercision*, (from *serra*,) and the two ends of the ligature, after this is adjusted, are drawn in such manner in opposite directions by a saw-like movement, similar to certain sports of boys, that the pedicle is rapidly cut through, and this *tearing* process (a species of torsion) may, he thinks, even prevent as much hemorrhage as in ordinary cases.

A *pediculated polypus* in the womb, to which a part of the placenta had become so firmly adherent, with perfect inosculation of their respective vessels, that the cord was broken off in an attempt to remove the secundines after the birth of the child, was effectually detached by M. Aubinais, (*Gazette Médicale*, Paris, Sep., 1844,) by twisting the polypus upon itself, by which means this foreign body, which had not it appears interfered with, but rather shared in the process of utero-gestation, was immediately brought away together, with its attached placenta. (See also Cormack's *Monthly Journal*, March, 1845, p. 243.)

A large *polypus* of a fibrous character was recently expelled from the uterus (*Provincial Med. and Surg. Journ.*; also *Edinb. Med. and Surg. Journ.*, Oct. 1, 1845, p. 283) by contractions of the organ artificially brought on by *ergot* of rye. T.]

#### ARTICLE X.—CANCERS OF THE NECK OF THE UTERUS.

Amputation of the neck of the uterus is one of the acquisitions of modern surgery. Osiander is the first person, who about the close of the last century, distinctly recommended it, and performed it in 1801. Tulpius, to whom M. Tarrau ascribes the honor of this operation, does not appear to me to be entitled to it. The sarcomatous tumors which he speaks of were evidently polypi. We no where find that he in reality contemplated extirpating the apex of the womb itself. Lazzari, who claims it in behalf of Monteggia; and Baudelocque who ascribes it to Lauvariol, have, in my opinion, fallen into the same error; nor have I had it in my power to ascertain that André-de-la-Croix and Lapeyronie did in reality perform this operation, as asserted by M. Tarrau. All that we can say is, that Wrisberg had recommended it in 1787, and that several persons had certainly performed it by chance, before any one suggested doing so designedly. The observations of Osiander were no sooner known in France, than Dupuytren hastened to adopt the ideas of the practitioner of Gottingen, and to submit them to repeated trials. M. Récamier was not long in pursuing the same course; so that in 1815, the excision of the neck of the uterus had already become among us, an operation in common use. At the present day it has been performed so great a number of times, and by so many different persons, that it would be wholly useless to enumerate the cases.

##### § I.—*Indications.*

The difficult point is to establish the indications clearly. The *elongation of the neck from simple hypertrophy*, being an infirmity rather than a disease, does not require it under any circumstance. *Excoriations, ulcers, and syphilitic vegetations*, not being incurable

in their nature, also, do not require it. The same remark applies to *indurations* and to *lumps (bosselures)* that are not painful, whether they are accompanied or not with chronic tumefaction, and which are so frequently seen in women between the ages of 30 and 40 years. It is not allowable, therefore, to have recourse to it except in clearly ascertained cases of *cancerous degenerescence*. But it is precisely in this point that lies the difficulty of the question. In fact, so long as the cancer is not ulcerated, or does not present itself under the aspect of a tumefied mass in the upper part of the vagina, its diagnosis is extremely difficult. The hardness, or natural consistence of the neck, the varieties that it presents in size, prominence, density and form, according to the age and various conditions under which the woman may have been placed, exact in the first place, a great deal of skill to prevent our sometimes apprehending affections of which there is not the slightest trace. Then again, how can we be certain that we may not be deceived in respect to the nature of a lesion so profoundly situated in the midst of a structure so compact, and one containing such a variety of elements? This is not all: though the presence of a cancer may be unquestionable, we have still to determine its limits. Now it is rare that all doubts on this point are dispelled before the disease has advanced very far, and then we can scarcely ever be certain that the neck alone is affected, and that the body of the uterus is not already more or less implicated. The surgeon therefore, is constantly placed between two difficulties: 1. The fear of removing an organ which is not diseased, and of unnecessarily performing a painful and dangerous operation; or, 2. That of removing only a portion of diseased structure, the remains of which will inevitably result in death. The natural conclusion from these remarks, is, that the formal proposition to amputate the apex of the womb, should be rarely decided upon, and that it is not to be wondered at that we should still meet with intelligent practitioners who with Wenzel and Zang, seriously ask the question whether it can ever be advisable. Since the question when this disease exists in the breast, has been deemed proper, what are the advantages of extirpation, it would be difficult in fact that the same question should not be put when the subject under consideration is the uterus. The reply, therefore, that may be made, is this, that while we admit it to be reasonable to extirpate external cancers, there would be nothing improper in applying this operation to cancers of the genital organs when they are under favorable conditions. It is a consolation to know that in these last cases the disease remains for a long time local, and that it is in reality less liable to repullulate on other points than in any other region. I do not, therefore, for my own part, consider that this operation ought to be absolutely proscribed. Better undertake it than abandon the woman to a certain death, in every case where the extent of the disease leaves room to hope that we may remove it entire.

## § II.

The neck of the uterus may be attacked by *three very different descriptions of cancerous degenerescence*. Sometimes the affection

proceeds by ulceration from its borders, or from its cavity towards the substance of its walls, and these ulcerations, which are sometimes covered with vegetations and fungosities, penetrate quite frequently into the interior of the womb, and present the same symptoms nearly as phagedenic (rongeant) cancer, and *noli me tangere* on the face or mouth. Sometimes, on the contrary, the disease consists of an encephaloid or scirrhous mass, which is developed in the tissues of the organ itself, near its free portion, or on any other point of its tissue. I have said above that encephaloid masses, primitively developed at the fundus of the uterus, sometimes protrude through the neck, and show themselves at the upper part of the vagina, under the form of a polypus.

### § III.—*Cauterization.*

Ulcerations, slight fungosities and granulations alone, admit of the employment of caustics, comprising among these latter the zinc paste, for tumors cannot in reality be removed except by extirpation, properly so called. Inasmuch as when the disease has yet extended but slightly, and has but little depth, we are rarely certain that it is a cancer rather than any other malady, alum, nitrate of silver, and nitrate of mercury ought in my opinion, in many cases, to be first made use of. When the affection is more advanced, and there is no longer any doubt about its malignity, we may choose between muriate of antimony, potash and chloride of zinc; as we may also, should we be so inclined, make use of the actual cautery. Nevertheless, as our object is not exclusively to destroy the tissues, but also to change the character of the morbid surface; and as the nitrate acid of mercury is of incontestable utility in a great number of other alterations of the same description, I can see no other than advantages to arise from its general adoption, and it is the remedy which I myself most frequently employ.

A. After having placed the woman, who is to be supported on the edge of the bed, and brought the disease into view by means of the speculum, the surgeon cleanses and dries the ulcer by successively applying to it, by means of a long pair of forceps, small balls of lint or small pieces of sponge. He immediately arranges between the circumference of the neck and the inner surface of the speculum, a small quantity of coarse lint, to prevent the caustic from extending to the sound parts, and then applies to the bottom of the ulcerous excavation, a crayon of caustic stone or nitrate of silver, either by means of the forceps or by a port crayon of some length, or supported in some other instrument. If he should prefer the nitrate acid of mercury, he saturates a roll of lint or fine linen with it, and conducts it to the parts in the same manner. Before withdrawing the speculum, injections of tepid water are to be thrown up and repeated, to prevent the cauterization from extending itself elsewhere than on the diseased part. The woman is then immediately placed in a general bath, and kept upon a convalescent diet. Should there be nothing more than simple excoriations, and slight ulcerations, it would not even be indispensable to wash the parts freely with water, and every other precaution almost would become unnecessary. The operation

is renewed a greater or less number of times, according to the effect obtained from it, every four, six or eight days, and we do not finally dispense with it until the wound becomes red, vermillion colored, and granulated, and presents in fact, the aspect of ulcers which are in the course of cicatrization.

B. It is also frequently useful to cauterize the entire *interior of the neck*. For this purpose we introduce into it the pencil or crayon, while the speculum keeps the lips open, and it was with the intention of performing this process, that various caustic-holders, extremely useless in my opinion, have been devised. Whether the cauterization may not appear to have been advisable, or has not been attended with success, and where, moreover, we are confident that the disease may be entirely removed, we must no longer hesitate, but proceed to excision.

#### § IV.—*Excision.*

In its natural state the free portion of the neck of the womb has neither three, four, six nor eight lines in length, but in fact, sometimes one and sometimes another of these dimensions, and without being on that account diseased. We may detach the vagina from the anterior lip to the extent of more than half an inch, without incurring the risk of opening into the peritoneal cul de sac, which separates it from the bladder; only, as the bladder adheres quite intimately to its anterior surface, this is the organ which may be then wounded by the instrument. Posteriorly the peritoneum not only lines the corresponding surface of the uterus, but descends down upon the vagina to form the recto-genital cavity; in such manner, that in this direction the bistoury would only have to go to the depth of a few lines to open into it. It must have been by inadvertence that M. Avenel (*Thèse*, No. 80, Paris, 1828,) has said that there are but eight lines of extent in front, and ten behind, between the apex of the lips of the neck and the interior of the abdominal serous membrane. As this is a gross anatomical error, I am surprised that it should have been again committed some years since, (*Gaz. Méd.*, 1833, p. 21, and 1834, p. 387,) and that M. Mury (*Thèse*, No. 41, Paris, 1826,) should have ascribed the *successes* of M. Lisfranc to this *discovery*.

A. *Operative Processes.*—The mode of performing excision of the uterus did not suddenly reach the degree of perfection to which we find it at the present day.

I. *Osiander* began by passing *two ligatures*, by means of a curved needle, through the diseased organ, which latter he depressed and secured in this manner, so as not to exsect it until after having brought it down nearly to the vulva. When he could not make it descend, two fingers introduced into the rectum enabled him to excise it in its place; but the invention of his *hysterotome* soon enabled him to dispense with his ligature tractors.

II. *Dupuytren*, and after him most other operators, have substituted for the ligature of the surgeon of Gottingen, a very long *Museux forceps*, the hooks of which are slightly curved, and by means of which we are enabled to embrace with facility the whole of the

diseased portion. As this forceps readily tears the tissues, and as it is frequently useful to apply a second one, M. Colombat has had one made with four branches. Others have proposed to introduce into the womb, through the opening of the neck, an instrument which might, in opening in the middle of the organ, be transformed into hooks, and allow of our making strong traction downwards. The most ingenious instrument of this kind is that of M. Guillon. (*Soc. de Med. Prat.*, 1827, 1828, pp. 72, 73.) Another, which is much more complicated, has been proposed by M. J. Hatin, and M. Récamier has since invented a third.

III. *Speculum*.—Osiander dispensed with the employment of the *speculum*. With us, on the contrary, this instrument has almost always been made use of; also a number of persons have endeavored to improve it. The one which M. Récamier first proposed was a simple cone of tin. Dupuytren added a handle to it, which gives more facility in its application. The ancients had one which is found figured in the works of Paré, Joubert, Manget, and Scultetus, and which was composed of two valves which could be widened or approximated at pleasure. That of Madame Boivin, constructed upon this principle, is formed of two halves of a cylinder, and has at its large extremity a handle terminated by two rings, like a pair of forceps. It is introduced, shut up, in the vagina, and all that is necessary is to act upon the two halves of its handle in an opposite direction, in order to open it in the manner of a scissors, and to dilate as much as we desire the passage to be explored. M. Lisfranc has had one constructed which differs from the preceding only in this, that its apex, which is somewhat flattened, is more elongated, also its diameter greater and its handle destitute of any rings. In order to keep it opened at such extent as we may desire, M. Guillon added to it a stem or sort of slider, which, being displaced by the finger when judged necessary, immediately enables us to shut it up again. The same practitioner, with a view to avoid the pinching of the tissues, to which we are more or less exposed with the ordinary jointed speculum, has added a third piece when we have adjusted the instrument in its place. This piece is a plate which is glided from the base to the point of the two principal halves of the instrument, upon a groove which is found upon each of them on the inner face of their free border. Not content with having a speculum with two branches, the triple speculum, which is also figured in the ancient works which I have just mentioned, has been revived. But as it is the upper part of the vagina, particularly, which we have to dilate, MM. Bertze and Colombat have contrived a speculum in the form of a cone, the base of which is found at the handle when it is shut up, and at the other end, on the contrary, when it is open. That of M. Bertze is composed of two tubes enclosed one within the other. The inner one, which is divided into several rays in its upper half, is disposed in such manner that its branches open by their own proper spring, as soon as we free them by drawing towards us the piece which serves, so to speak, as their sheath. Eight pieces compose that of M. Colombat, and form in their ensemble a hollow cone, the point of which is opened or contracted to a greater or less degree when the instrument is in its place, by means of quick screws placed at the

two extremities of one of the great diameters of its base. When open this instrument represents a sort of grillage, the same as is seen in the speculum of Dugès or M. Mayor, and which enables us to see at the same time both the neck of the uterus and the interior of the vagina. Of all these varieties of speculum, that which Mad. Boivin suggested, (*Bull. de la Fac. de Méd.*, t. VII., p. 349,) but which has undergone remarkable improvements since, appears in my judgment to be the best. The only inconvenience which I find in it, is that of allowing the mucous membrane of the vagina to become caught between its borders, and of exposing to the risk of pinching it when it is shut up. But this inconvenience, which the proposed modifications have as yet but very imperfectly remedied, exists to a much greater degree in the speculum with three branches of M. Hatin, in that of M. Colombat, and even in that of M. Bertze, all of which, moreover, may wound the organs by their point and are far from reflecting the light with as much advantage. Under this last point of view, the original speculum or simple cylinder is still the most commodious, without even excepting the cribriform or perforated speculum contrived by M. Ricque. At the present day we have, moreover, the speculum of M. Galenzowski, (*Journ. des Prog.*, t. V., p. 237,) which differs from the ordinary speculum only in having a cylinder or cap of ebony, which is adjusted upon it in order to introduce it, and which speculum M. Melier (*Mem. de l'Acad. Roy. de Chir.*) considers as the best; also we have the speculum of Lair, (*Arch. Gén. de Méd.*, t. XVII., p. 141,) that of M. Jobert, the speculum of M. Ricord, that of M. Sirhenry, those of M. P. Dubois, (*Ibid.*, t. XXII., p. 278,) M. Moreau, M. Clairat, and M. Charrière, without counting the vibratory speculum of M. Duparcque.

IV. As to the *cutting instrument*, properly so called, many descriptions of these also have been made use of. Dupuytren, for example, frequently made use of a sort of scoop or trowel, somewhat concave, and having a cutting edge only on its upper extremity, which is convex, and of a semilunar form. By means of a circular movement this blade will divide the neck at the bottom of the speculum; and it may even be made, if necessary, to penetrate into the womb, so as to hollow out this organ in the manner of a cone. M. Hatin has applied to the stem of his principal instrument, a forceps terminated by two cutting extremities, like the spoon-shaped forceps of F. ab Aquapendente, or that of Lobstein. The erigne forceps of M. Colombat has combined with it a stem, upon the extremity of which is situated a small blade placed transversely, which may be elevated or depressed by means of a particular apparatus, and which, when turned upon this stem, smoothly cuts the entire circumference of the neck above the prongs of the erigne. The hysterotome or seicator of M. Arrhonson, (*Ibid.*, t. XXII., p. 278,) would be at the same time more simple and more convenient, if instruments of this kind could be substituted for the bistoury in an operation of this description.

V. Even the *ligature*, as mentioned by Lazzari, and which might in fact be applied, has also had its advocates. M. Mayor thinks, and not apparently without reason, that by introducing above the disease a silk ligature with his conducting instruments, the neck of

the womb might afterwards be readily strangulated by means of his chaplet constrictor.

VI. Finally, all these modifications of the *operation* may be classed under two methods, one which consists in making the neck descend as low as possible before excising it, and the other, which gives the preference to excising it in its natural position. This last at first sight seems much more advantageous than the other in this respect, that it protects us from all kinds of traction or laceration. Nevertheless, it is less convenient, in the first place, because it does not allow us to ascertain with as much precision the condition of the parts, nor to penetrate as far or with as much security in the direction towards the womb, and in the last place, because it is from this circumstance evidently more difficult of application. It does not therefore deserve the preference, except in those cases in which the uterus is too firmly fixed to enable us by the most judiciously directed tractions to make it descend into the lower strait. In the first, there can be no longer any question about the threads of Osiander, since we have known how to modify in a proper manner the erigène forceps. The speculum also, of whatever description it may be, appears to me to be much more embarrassing than useful. The hooks of the instrument, guided by the fingers of the left hand, may always be placed around the neck without much difficulty. If it should become advisable to increase their number, in order to prevent any laceration, it is better to imitate Dupuytren, and place a second Musseux forceps above or upon the opposite side of that of the first. As the straight bistoury wrapped in a band may be conducted to a sufficiently great depth in the vagina, it has appeared to me to be as useful as any other instrument. I have no necessity of remarking, that the tractor instruments which open themselves in the interior of the parts, would in most cases be dangerous, and that they ought to be absolutely rejected. When we are obliged to excise the neck of the womb without displacing it, it is difficult to dispense with the employment of the speculum. As we require as much space and freedom as possible, the jointed speculum is then the only one which could fulfil the intentions of the surgeon. It would be in such cases also that we might, if necessary, make use of the scissors that are slightly curved, the cutting ring, the scoop of Dupuytren, or the bistoury which is concave on one of its flat sides near its extremity.

VII. *Operative Process.*—The woman is placed in the same way as for cauterization. One assistant supports her head and arms, two others attend to her lower limbs, and a fourth hands the instruments as they may be required.

a. *Introduction of the Speculum.*—The surgeon placed in front of the vulva, begins with the introduction of the speculum, if he has decided upon using this instrument. After having besmeared it with cerate, he glides it gently into the axis of the pelvis, resting it chiefly upon the posterior commissure of the pudendum at first, directs it in this manner to the seat of the disease, and inclines it more or less in front, posteriorly or to one side, according as the neck presents itself more or less perfectly at its extremity; and on the contrary opens it if it is jointed, in such manner as to dilate the vagina completely, and to expose the whole extent of the mischief. Upon the

supposition that he wishes to leave it in its place to apply the forceps, he immediately causes it to be held by an assistant until he has accurately adjusted them. He then withdraws it, and it is at this moment particularly that the jointed speculum possesses an advantage, by allowing the forceps to be readily disengaged from it above.

b. If the operator dispenses with the speculum, *two fingers* of his left hand are first introduced into the bottom of the vagina, where they are to remain, after having recognized the form and extent of the cancer. He then conducts the forceps, shut up, upon their palmar surface, opens it on reaching the tumor, and applies it as high up as possible, in such manner that its hooks may be implanted on a sound portion of the neck. By means of this forceps, which should be inserted by pushing rather than by drawing upon it, he endeavors to make the organ descend into the vulva. In place of effecting these tractions with the two hands, it is better to employ the right hand only, acting all the while in the direction of the axes of the pelvis, and to make use of the fingers of the left hand to protect, without ever letting go their hold upon the hooks of the instrument. If he perceives that these hooks have lost their hold, or that the parts embraced by them have a tendency to become lacerated, he immediately applies a second forceps on the opposite part of the diameter of the neck, after having charged the assistant to hold the first.

c. When the *parts are brought out* he cautiously separates the sides of the vulva; gives the tractor instrument or instruments to one of the assistants, and having seized the bistoury which has been prepared applies it first on the right side and always above the disease, brings it in front and then to the left, or might also make the section of the parts from behind forwards and from left to right. If the disease should not appear to be accurately defined, he should attend to the adhesions of the vagina and destroy them, little by little, in such manner as to remove not only the os tincæ but also the upper portion of the neck, and to hollow out the lower part of the womb itself in the manner of a cone, upon the supposition that this should be deemed necessary.

d. As soon as the excision is completed, the fundus of the organ mounts upwards and resumes its natural position. If any remnants or tubercles of the cancer have been left behind, we must re-introduce the speculum, grasp them with the forceps, and immediately exercise them, or we may destroy them by means of caustics.

VIII. *Subsequent Treatment.*—When there is no hemorrhage, there is no necessity of any dressing. We confine ourselves during the first days to injections of tepid or cold water. Nevertheless I could see no inconvenience in gliding in upon the bleeding surface a fine piece of linen in the form of a chemise, to be lightly filled up with small balls of lint. If the blood flowed in too great abundance, this chemise would give a great degree of facility to the tamponing, and would expose to no dangers which could not be immediately remedied.

The *dangers of excision of the uterus* arise from: 1. Hemorrhage, which M. Pauly (*Malad. de l'Uterus*, pp. 446, 447, 448, 451, 453, 454) has seen take place in seven instances out of thirteen cases, and result in death in three women at the end of a few hours; 2.

Peritonitis, which also frequently occurs; 3. Phlebitis, which has already been observed in several instances; 4. Purulent inflammations in the pelvis; 5. Perforation of the peritoneum, rectum or bladder; 6. A return of the disease.

IX. *Appreciation.*—Up to the present time I have performed excision of the neck in but eight instances, and for that purpose have required nothing more than Museux's forceps, a knife, curved scissors, and a straight bistoury. In the first woman the whole of the neck was diseased, and the operation was prompt, easy and attended with but little pain. A certain quantity of blood was discharged, which was checked by the use of simple means. She died, however, on the third day, but we found, on opening the body, neither peritonitis nor other appreciable lesion. The rest of the uterus was sound, but there was a small cerebriform mass upon the right of and behind the vagina. An opening also, of two lines in extent, was found on this wall of the vulvo-uterine passage, and communicated with the recto-genital cavity. Was this produced by the operation, or did it depend on the manipulations used in the autopsy? This is what we could not ascertain, but we clearly satisfied ourselves that no matter had been effused through this opening. In the second case, finding some difficulty in bringing the cancer down, I introduced without any great degree of difficulty, above its situation and at two inches depth in the vagina, the straight bistoury wrapped in a bandage, and guiding it upon the palmar surface of the fingers of my left hand, in this manner terminated the operation. This patient, who at first appeared to be doing well, died at the expiration of six weeks. She had a number of cerebriform masses in the lumbar region, and also in the substance of the broad ligament on the right side. I proceeded in the same manner with the third patient, about the close of the year 1832, at the hospital of La Pitié. The top of the neck formed an encephaloid mass of a mushroom appearance, which was as large as the half of the fist. No accident interrupted the cure, and the woman, who was perfectly restored, came to see me a year after to know if she could resume her conjugal duties without any danger. In the fourth, fifth, sixth and seventh cases, there was a return of the disease. The eighth woman, whom I operated upon at La Charité, in 1836, was cured without any accident, but it is not certain that the tumor was a cancer. None of them had any serious hemorrhage.

A. A patient operated upon by M. Blandin, died of uterine phlebitis. MM. Rust and Graefe at Berlin, and M. Roux and Dupuytren, have also seen death take place in some instances from the immediate consequences of the operation. Excision of the neck of the uterus, therefore, though easy and in many cases unattended with serious consequences, is nevertheless in some instances dangerous and speedily fatal. From the considerations, moreover, which have been laid down in the beginning of this article, it would seem that it can but rarely be successful. It has however been greatly extolled, and Osiander has performed it 28 times, Dupuytren from 15 to 20, and M. Lisfranc from 40 to 50. Women who have been submitted to it, have been enabled to become pregnant, and have been delivered once or oftener without accident. Dupuytren even relates

cases in which he was obliged to operate a second time, in consequence of a return of the disease, but which were nevertheless cured. Finally, it is asserted that in the great majority of cases the cure has been radical.

B. Without examining in this place whether, since excision of the neck of the uterus has been employed in practice, it has not been quite frequently had recourse to when there was no cancer as some persons have maintained, I will confine myself to remarking that Du-puytren, who, so to speak, introduced it into France, ultimately rejected it; that M. Lisfranc also appears to perform it less frequently than formerly; and that Osiander himself, according to M. Heisse, no longer made use of it for some time before his death. The two examples related also by M. Stoltz, are but little calculated to present a very favorable idea of it. Of the six patients operated upon by M. Cazenave, (*Bull. de l'Acad. Roy de Méd.*, t. I., p. 930,) four died, one only was cured, while the sixth was in good health at the moment at which he wrote. Moreover, a report which was first indistinctly circulated on this subject, has ultimately made its appearance in scientific works. Thus M. Krimer, (*Revue Méd.*, 1835, t. III., p. 254,) asserts that excision of the neck of the uterus has never succeeded *when the disease was an actual cancer*; that at Paris every body is under a delusion on this subject; that a lady who was given out as cured to the learned societies and journals of medicine, never has been cured, while M. Pauly, (*Mal. de l'Uterus*, 1836, in 8vo. of 536 pages,) sustained by MM. Carron du Villard, Treille, Duparcque, &c., holds precisely the same language! M. Lisfranc, who is especially implicated in this matter, and who states that he has succeeded in 84 operations out of 99, (*Gaz. Méd.*, 1834, p. 389,) must, if his former assistants are to be believed, have recklessly (éffrontément) abused the public, the physicians, and the academies, in citing as cured a number of women who died; in exaggerating to twice their amount the number of his operations; in amputating as cancerous the neck of the womb when it was scarcely diseased; and in being guilty, we must confess it, of actual atrocities, (*atrocités*), if the accusations against him are true. The facts enumerated by M. Pauly are moreover so precise, so numerous, and apparently so conclusive, that the feelings are outraged by them, and that it must ever appear extraordinary that M. Lisfranc has never disavowed them. Perceiving that M. Pauly is deceived in relation to what concerns myself, I am on my own part disposed to think that he errs also in regard to his former preceptor, but the honor of M. Lisfranc, and his regard to truth, (*sa moralité*), imperiously demand an explanation on his part of so grave a question.

C. Reducing the operations of M. Lisfranc to 47 for example, in place of 99, M. Pauly finds at least thirty failures. In a list of 23 *successful cases*, deposited at the Institute, and which this physician has examined, he finds that three were repetitions, 9 supposed cases, 2 cases of excoriations that were merely cauterized, 2 excisions of small polypi, 2 cases of return of the disease, and three or four only of actual success! Out of 14 operations which he himself was witness to in the practice of M. Lisfranc, from January 1st, 1833, to January 1st, 1836, M. Pauly affirms that one only probably was fol-

lowed with success ! It must be confessed that if such assertions are false, M. Pauly is highly culpable, he especially the favorite (particulier) pupil and confidential secretary of M. Lisfranc ! But also, if they are true, what a disgrace to the profession, and by what name should we characterize the author of such crimes, (*méfaits* ?)

D. *In fine*, I would not recommend that the neck of the uterus should be excised for simple ulcerations, if it is not in a cancerous state. I am aware that in cases of cancer the disease may repullulate ; that when it is not possible to remove the whole it had better not be meddled with ; that errors have been committed under this double point of view ; that men with a usurped reputation and trampling under their feet the laws of humanity, have dared to justify in some instances the acts reprobated by M. Pauly ; but I do not grant that this operation in itself is as brutal as has been asserted, nor that when it is performed under the conditions indicated above, it ought to be any more proscribed than amputation of cancerous tumors of the breast, testicle, or in fact any other region ; it is the abuse of the operation, and not its use which we ought to condemn.

#### ARTICLE X.—EXTIRPATION OF THE UTERUS.

The removal of the uterus was for so long a time deemed impossible, that even in our days it is still doubted if the operation has ever in reality been performed. A very different opinion however has been advanced by a number of authors at almost every epoch. To prove that this organ is one of little importance in woman, Soranus (Peyrilhe, *Hist. de la Méd.*, p. 282) affirms that it may be removed without causing death, *as Themison*, he says, *demonstrates in his writings*, and he even goes so far as to lay down the operation as a precept ; for he recommends, without any reserve, that the prolapsed uterus should be extirpated if it is in a *putrified state*, and positively asserts that it has been, in some instances, excised entire with success. To understand ourselves on this subject it is necessary that we should not confound extirpation of the uterus in a prolapsed state with extirpation of a cancerous uterus which has not been displaced.

#### § I.—*Prolapsed Uterus.*

In the additions of Bauhin to the works of Rousset, we find nineteen cases which in part justify the boldness of the physician of Ephesus, and Schenck relates a still greater number, but which all have reference to prolapsus of the womb. Nevertheless, inasmuch as among the cases which are described, there is a considerable number of them which are deficient in the necessary proofs and details, they have possibly been rejected without examination. Rousset exhibits so much want of good faith in his work, and Bauhin and Schenck appear to be so credulous, that we are naturally induced to distrust their testimony. How can we believe that the uterus was removed in the woman mentioned by Plempius, but who nevertheless afterwards became pregnant ; or how believe in the case of another who, according to Plater, retained her venereal desires and

continued to have her catamenia? Or in a third case cited by Schenck, from Carpus, or in that mentioned by Morgagni, from Wiedmann, and in both of whom were presented the same phenomena? Will Vieussens, who gives the details of an autopsy in a woman from whom he removed the uterus fifteen years before, produce greater conviction in the mind because we find him asserting that a remnant of the organ had been left at the bottom of the pelvis? The case of a certain Pierrette Boucher, who was operated upon three years before, and whom Rousset disinterred three days after her death and opened in the presence of a physician and midwife, whom he does not name, could it be any other than a tale invented for pleasantry? Nevertheless it is an incontestable fact at the present day, that the ablation of the prolapsed uterus has been performed in a number of instances, and that in certain cases the women have survived. Without speaking of the instances cited by Moschion, Avenzoar, Rhazes, Mercurialis, Woega, Fernel, and Benivenius, (Bonet, *Corps de Méd.*, t. IV., p. 599,) &c., we find one in Paré which cannot admit of a doubt. The operation took place in 1575, on King's day, and the woman did not die until three months after, and of another disease. Upon opening the body Paré was enabled to prove the absence of the uterus, and he remarked as a beautiful arrangement, that nature had done nothing more than *construct*, in place of the extirpated organ, a simple induration at the bottom of the pelvis. In this point of view we may classify the facts that are known in relation to the extirpation of the displaced uterus, under two principal heads; in one there has been a simple prolapsus of the organ, while the others relate to its *inversion*.

A. *Prolapsus*.—Among the first are to be reckoned, as I consider, the case of H. Saxonia, in which it is perceived that a servant woman of Venice tore out herself her prolapsed uterus; those of Paul of Leipsick, Cohauzen, Tencel, Goulard and Blazius; and those even that Laumonier in 1784, Clark, Vanheer and A. Hunter in 1797, and that M. Hosack, and M. Galot of Provence, in 1809, have since published. If all these facts could not be received as authentic, or if it should seem evident that Laumonier and Bardol, among others, have only removed a polypus in place of the entire womb, the same conclusion no longer applies to M. Galot, (*Bull. de la Fac.*, 5th year, p. 15,) who transmitted his specimen to the Faculty of Medicine at Paris, nor to M. Marschall of Strasbourg who, upon the death of the woman ten years after, had an opportunity of verifying upon the dead body the absence of the uterus. M. Langenbeck, moreover, (*Bull. de Fér.*, t. XVII., p. 72,) performed this operation with success in 1813. Nor can the case of Fodéré, published in 1825, or that of MM. Recamier and Marjolin, (*Revue Méd.*, t. IV., p. 392; *Arch. Gén. de Méd.*, t. X., p. 88,) that of Delpech and that of M. Bellini, (*Mém. sur l'Amput. de l'Uterus. Broch.*, 1823,) admit of the least doubt on this subject. The prolapsed uterus, therefore, has been in several instances detached from the body without causing the death of the woman.

B. *Inversion*.—In the second class, which also comprises doubtful facts and such as have a greater or less degree of authenticity, is to be included the case of Ulm, who states that a midwife, after having inverted the uterus by drawing upon the umbilical cord, removed the

organ with one cut of the razor; the other fact also, almost in every respect similar, except that the woman got well, which is related by Bernard; a third of the same character, mentioned by Vrisberg; that by Viardel; a fifth published by Caillé and obtained in the Bas-Poitou; that published by Anselin of Amiens, and in which he himself removed the inverted organ; in a word, to this class belong the cases of R. Baxter, Müllaer, Jean Müller and Sorbait; those related by Figuet of Lyons, and Faivre of Vesoul; and that in which it is asserted that Desault excised a portion of the fundus of the inverted uterus, while removing a polypus. Without enumerating the cases of Gattinaria, Béranger de Carpi and Fonteyn, quoted by M. Dezeimeris, we must add also to this list those taken from the practice of MM. Chas. Johnson, (1822,) Newnham, (*Journ. Univ. des Sc. Méd.*, September, 1818,) Windsor, (1809,) Rheineck, Davis, Chevalier, Weber, Gooch, Cordeiro, &c.

I. *Partial Inversion.*—There is a kind of inversion which has not sufficiently attracted the attention of surgeons; it is that which takes place partially only. We then perceive in the vagina a firm elastic pyriform tumor, which readily bleeds and is terminated above by a pedicle of an inch or two in diameter, and which conveys the idea of a fibrous polypus, and is ordinarily accompanied with intermittent hemorrhage, a sense of drawing down in the loins and groins, and by a feeling of weight upon the fundament. It is distinguished from polypus by its velvety aspect, its reddish or violet-like color, its neck, which the orifice of the attenuated uterus encircles in the manner of a ring, and by the void which the fingers introduced into the rectum or the hand applied over the hypogastrium, while other fingers are introduced into the upper part of the vagina, find to exist in the place which should be occupied by the womb. This malady, from its coming on in some instances without the woman being conscious of it, or without any previous accident, cannot be recognized until after the expiration of several months or even of a year. It is not always then easy to distinguish it from a polypus, notwithstanding the signs which I have just given. The proof of this I saw in 1836, in a lady 24 years of age. Since her delivery, nearly three years before, she had been constantly annoyed by losses of blood, which were sometimes small in quantity and at other times abundant. Some of the surgeons of the country had at first supposed it to be an inversion of the uterus, but the others finally came to a decision that it was a polypus. This lady, having come to Paris, consulted several practitioners, who all adopted this last opinion. Its extirpation was decided upon, when I in my turn was requested to see her. Having entertained some doubts, I repeated the examination of the tumor, which was of the size of an egg, and had the density, elasticity and form of a fibrous body descended into the vagina. Having placed my hand on the hypogastrium, and the forefinger as high up as possible in the rectum, while with two fingers of the other hand I embraced the neck of the tumor, I was enabled to satisfy myself that there was nothing in the usual place occupied by the womb, and felt authorized in asserting that the case in question was one of inversion of the uterus, instead of one of polypus. The event demonstrated, as will be related farther on, that this diagnosis was correct. In a

case precisely similar, which A. Petit (*Soc. de Santé de Lyon*, 1798, p. 103) and the surgeons of the Hospital of Lyons had supposed to be a polypus, Rey placed on the neck of the tumor a ligature which caused such acute pain that he did not dare to continue the operation. The woman died a few days after, and an autopsy of the dead body showed that the case was one of inverted uterus. The embarrassment is sometimes so much the greater from the fact that polypi of the uterus may dilate and gradually attenuate the neck of this organ by dragging down the fundus and inverting the entire body of this organ. I have already related an example of this kind, verified at the opening of the dead body, in treating of polypi, and I met another in 1839, in a woman who also died of peritonitis. If no variety of polypi exhibited a velvety appearance, or emitted from its surface a sanguineous exhalation, in the same manner as does the proper tissue of the womb, we might perhaps obtain more authentic signs by means of the speculum than by the touch. A tumor however which is velvety, of a reddish color, bleeding, destitute of prominences, pyriform, surrounded above by a circular groove like a cul de sac, sensitive and painful upon pressure, while at the same time there is found to be a void in the place that the uterus occupies, must be considered to be an inversion of the uterus and not a polypus. Incomplete inversion involves accidents of a more serious character than a prolapsus or a descent of the womb, properly so called. The repeated hemorrhages which it occasions gradually exhaust the woman and ultimately terminate in death. The patient cannot get up or take the slightest exercise without being threatened with syncope, or without feeling a sense of weight and traction, which soon give them cause for alarm. A lady whom I frequently saw with M. Marjolin, in 1836, was in this condition after four years of suffering; this lady, who was pale, anæmic and already attacked with swelling of the feet, though in other respects in tolerable health, could not rise from her bed, and was constantly troubled with a sanguineous or leucorrhœal discharge. Having returned to her province without having been benefitted by our treatment, she continued there in the same state, and I have heard nothing further from her since the year 1837. Should the accidents which partial inversion produces be of trivial character, or allow of the woman taking some exercise, and of attending to some of her occupations, we ought to confine ourselves to the palliative treatment, that is to say, to a mild diet and astringent injections, or even the use of a saucer or gimlet-shaped pessary. Under opposite conditions there are grounds for attempting a radical cure.

*a. Reduction.*—The diagnosis having been once clearly ascertained, it would appear that the first indication to fulfil should be to reduce the tumor and return the organs to their natural position. Experience, unfortunately, has too frequently proved, what reasoning moreover would point out, that this reduction is almost impossible, and that it would not always be prudent to attempt it. In the first hours or days which succeed to a uterine inversion, we might hope for success in attempting reduction, because then the inverted portion is still supple, and the neck through which it has protruded is not contracted and indurated to such degree as absolutely to prevent its

reascension. At a subsequent period, and after several months or years have passed, we can no longer hope for such a condition of things. Now the tissue of the womb has adapted itself to its new form and its new position. Its mucous surface has assumed the dimensions of its former external surface, while this latter has become contracted within in such manner as no longer to represent anything more than a cavity of very small extent. The neck contracted upon itself, has become too narrow to admit of the return of the body and fundus of the uterus, which are below it.

*b. Removal of the tumor.*—Consequently, in order to cure a woman at this period of her disease, we have no other resource left than ablation or strangulation of the tumor; this operation, therefore, then becomes a modification of that of extirpation of the uterus. Whether we make use of the ligature, or have recourse to excision, the operation has always appeared to be of so dangerous a character, that but few surgeons have had the courage to undertake it. If we strangulate the tumor in the same manner as a polypus, by one of the processes pointed out above, we have to make so powerful a constriction, and one that is protracted to so long a period of time, that it is soon succeeded by excruciating pains, nervous symptoms, or even convulsions, and sometimes by a fatal peritonitis. In cases of excision, the hemorrhage may be of a frightful character; as we open the peritoneum, peritonitis is still more to be apprehended than in the preceding case; the blood retained in the vagina may pass into the abdomen, while the intestines may protrude in the direction of the vagina. Unfortunate cases, taken from the practice of several celebrated surgeons, may be adduced in support of these assertions. We should go too far, however, in supposing these operations always fatal. The young lady of Châteauroux, whom I have mentioned above, is a proof of this. I grasped the tumor with an erigne forceps, which I placed in the charge of M. Rivaillé, the family physician of the patient, and who officiated as my assistant. Two fingers of the left hand introduced in advance, served me as a guide for a long curved knife, with which I divided layer by layer the entire neck of the organ, in such manner as to leave nothing of it behind but the part which was embraced by the neck of the uterus. The finger being introduced through the wound, entered freely into the peritoneal cavity, and could distinctly feel the intestines. It was easily perceived immediately afterwards, that the totality of the body of the uterus had been removed, and the specimen which I have preserved for a long time, has left no doubt on this point in the minds of those who have examined it. The hemorrhage was slight, but excruciating pains, cramps, and an extreme degree of agitation with syncopes, which soon came on, continued with so much intensity during the space of three days, that we had entirely given up our patient in despair. Opiate preparations internally and externally, mercurial unctions upon the lower part of the belly, Seltzer water, and the potion of Riverus, administered for the nausea, ultimately succeeded in calming all these accidents, so that in less than a month the cure was complete, and has since remained permanent, though the operation took place in 1836. (Thouret, *Thèse*, No. 345, Paris, 1836, p. 20.) The only circumstance which has sometimes

still caused anxiety in the mind of this lady, who has never known what was removed from her, is that of no longer having her cata menia! A case almost in every respect similar, belongs to M. Lasserre, (*Arch. Gén. de Méd.*, 2d ser., t. VIII., p. 395.) Operated upon eighteen months after delivery, the ligature was first placed on the neck of the tumor, which resulted in producing excessively acute pains. The surgeon then proceeded to excision; new accidents supervened, but the woman ultimately recovered. A similar operation performed about the same time in England, by M. Blox ham, (*Gaz. Méd.*, 1837, p. 122,) caused the same agonizing pains, but ultimately resulted also in a cure. It was the graduated ligature, and not excision, that this surgeon made use of. A. Petit (*Soc. de Sant. de Lyon*, 1798, p. 209) affirms, however, that an experienced surgeon, mistaking an inversion of the uterus for a polypus, strangulated and successfully effected the separation of the tumor, without occasioning any severe accidents. If it should seem surprising that so many accidents supervene in consequence of the excision of an everted uterus, while the extirpation of the uterus, in its natural position, or entirely prolapsed from the pelvis, does not always produce the same results, I would remark that in partial inversion, the instruments and ligature are necessarily applied directly upon the tissue of the uterus itself, and that in cases of this kind, the women who have been delivered only some months or some years before, are of necessity still young. Those two cases which I have met with, were of the ages of 24 and 26 years. As to the choice to be made between extirpation and the ligature, this must necessarily be embarrassing in the present state of our knowledge upon this subject. *Strangulation* appears to be constantly followed with excruciating pain, but the hemorrhage which may succeed to simple excision, has also something in it of a frightful character. It is true however that I did not find this take place in the patient of M. Rivaillé, and that in fact we cannot in this region divide any vessels of very considerable size. This is a question therefore which in all its relations should be re-examined and re-investigated. The manual of the operation, moreover, whatever may be the process we adopt, is the same as for polypi, or the extirpation, properly so called, of the displaced uterus.

II. *Complete Inversion and Protrusion of the Uterus.*—If all attempts at reduction have failed, and the disease appears to threaten the life of the patient, we may have recourse to the ablation of a uterus which has descended outside of the vulva; but we must not forget that the pure and simple prolapsus of the womb is rarely fatal; that it may constitute nothing more than an infirmity; that it has in several instances been susceptible of pregnancy, as is proved by the case related by Marigues of Versailles and that of M. Chevreul; that in most cases the general health scarcely suffers; and that there should be a degenerescence and morbid condition, which are in themselves dangerous, to compel the surgeon to adopt a decision of this kind. Its inversion after the expulsion of the foetus is in general so easily remedied, that it cannot, except in rare cases, require the interposition of so dangerous an operation. Nevertheless, should the woman have been badly treated, or should brutal or ill-directed manipulations have brought about a state of gangrene or disorganiza-

tion in the uterus, so that there could no longer be any possible hope of replacing or preserving it, its ablation would be a final resource, which we should be wrong to deprive ourselves of; not losing sight, however, of the fact, that the women mentioned by Blasius, F. de Hilden and Ulmus, as having been operated upon by midwives, died in consequence thereof; that the same result took place in the patient of M. Wolf, (*Journ. de Graefe et Walther*, vol. VII., p. 482;) that the patient of MM. Récamier and Marjolin survived only two months; that an unfortunate woman received in La Charité, in the month of July, 1824, and in whom the inverted womb had been by mistake constricted by a ligature eight days before, also succumbed a few weeks subsequently; and finally, that if the two cases related by M. de La Barre and Baudelocque, in which it is seen that the uterine inversion disappeared spontaneously at the expiration of several weeks in the first, and after a continuance of more than seven years in the second, should be deemed authentic, amputation in such cases can be but rarely indispensable. The woman who, according to M. Swett, (*American Journ. Med. Sc.—Gaz. Méd.*, 1834, p. 665,) recovered, notwithstanding she had lost in this manner the entire uterine system, bladder, rectum and perineum, would have obviously been less fortunate, if in place of being born in America, she had lived among us! The persons who have performed ablation of the displaced uterus, through ignorance or rashness, have conducted themselves in such manner that their process does not merit any consideration. Nor can we in fact any longer treat of tearing out or excising the womb with a kitchen-knife or razor, without any preliminary precautions, nor of hot ashes, or other caustics used by certain women and charlatans, and by some ancient authors. The rational methods, from which we are now permitted to make a selection, are, strangulation with or without immediate excision, pure and simple amputation, and extirpation with dissection of the peritoneum.

a. The *ligature* is extremely easy, and so much the more so as we have under our eyes the pedicle, around which it is thought advisable to apply it. But this pedicle possesses a certain volume, and the pains caused by its constriction have in more than one instance been so acute, that the life of the patient appeared to be in imminent danger from it. In the patient of M. Marschall, among others, it soon became necessary to divide the thread, and the excision, which was decided upon on the spot, was followed by complete success. This ligature, moreover, exposes to the danger of including in its constriction either the urethra, as was seen by Ruysch; or a noose of intestine, as happened to the charlatan mentioned by Klein, or the other spoken of by Reyneck; or the bladder, &c. With a view of effecting the excision more promptly, and of causing less intense pain, M. Windsor, as Faivre had done before him, perforated the root of the tumor with a double thread, in order to strangulate its two halves separately. The cases, however, of Newnham, Clarck and M. Récamier, prove beyond dispute, that the ordinary ligature is not always dangerous in such cases. By means of excision we give more prompt relief to the patient. As the ligature can have no other object in view than to prevent hemorrhage, we cannot perceive what advantage at least, there would be in assigning to it the office

of separating the organ entire. If, therefore, we adopt strangulation either in its simple form or after having separated the root of the body which is to be removed, into several portions, it would, as it appears to me, be advantageous to excise immediately the entire mass, which is situated below the constriction. This is the way in which Baxter, Bernhard, and a great number of others have operated. Nothing more would be necessary to avoid wounding the intestines or excretory apparatus of the urine, than to make some movements on the pelvis, by elevating it upon the bed a little higher than the rest of the body. Moreover, the pain, which is caused by pinching the intestines, the only accident of this kind that the most delicate degree of attention does not always enable us to prevent, will point out the mistake sufficiently soon, to enable us easily to apply a remedy without delay, and unless the constricting thread should be carried very high up, as it was by the charlatan mentioned by Ruysch, the bladder and the urethra will be always placed out of any danger. The *multiple ligature*, which has unquestionably the same advantages in these cases as in epiploic hernias, causes less pain than an ordinary ligature, because it produces fewer tractions, and puckerings on the root of the organ, divides the parts more rapidly, and is less exposed to slip and lose its hold, when excision is performed at the same time.

*b. The excision of a uterus* which has been for a long time protruded, nevertheless appears to me more worthy of general adoption than the ligature. The only danger which accompanies it is hemorrhage. But the vessels contained in the pedicle of the tumor are of sufficiently small size not to give rise to any serious apprehension in this respect. Moreover, what would hinder our making use of the ligature upon them should it seem proper, or from employing topical astringents, tamponing, and cauterization with the hot iron? Excision, which is less painful and more prompt, possesses incontestable advantages over strangulation, and must necessarily procure a greater number of successful results. This was the process employed in the patients whose cases are related by Paré, Bernhard, &c. Furthermore, I do not see what we should gain by imitating M. Langenbeck. The female he operated upon had a partial prolapsus with scirrhous degenerescence, like those of Ruysch, and MM. Hosack, Wolff, Fodéré, and Récamier. This surgeon deemed it advisable to dissect cautiously the whole of the uterine peritoneum, from the exterior to the interior, so that after the removal of the organ this membrane was found intact. It is true that his patient recovered perfectly, and that she is still living at the present day. The introduction of the air into the cavity of the abdomen through the vagina, a thing which is considered possible even after the cure, by Rousset, who mentions an example, and dangerous by Siebold, who ascribes to this the death of one of his patients, would then be effectually prevented. We would remark, in the first place, that what has been said on this last branch of the subject, is confined to bare assertions, which may be easily refuted; and in the second place, that if it were necessary to follow the process of M. Langenbeck, excision would become one of the most tedious and difficult of operations.

§ II.—*The Womb not displaced.*

If we may believe Lazzari, the complete removal of a uterus which was not displaced, was performed in three instances by Monteggia, about the beginning of the present century. De Siebold also states that Osiander, the father, performed this operation in one instance with success. It appears certain at least that on the 13th April, 1812, this operation was actually performed by Paletta; but it was through a mistake on his part; the author wished to remove only the neck which had become cancerous, and did not perceive that he had detached the entire uterus, until on examining it after the operation. It is therefore to Dr. Sauter of Constance, that we are indebted for having first suggested the idea of this operation, and for having performed it. In this point of view, we may now ask the question, if extirpation of the uterus be in reality practicable, and whether it is useful, and in what way it may be attended with danger. A word or two on each of the cases which we now possess, will enable the reader to form a correct judgment on these different points.

A. *Examination of the facts.*—The patient of M. Sauter, (*Bull. de Fér.*, t. II., p. 321—*Arch. Gén.*, t. V., p. 616,) who was operated upon on the 22d Jan., 1822, died four months after, and from, the author says, a *paralysis* of the lung; the bladder had been wounded. On the 5th Feb., 1824, M. Hoelscher repeated the operation of the surgeon of Constance, and death took place at the expiration of twenty-four hours. The patient operated upon by de Siebold on the 19th April, 1824, survived only sixty-four hours; and the one operated upon by M. Langenbeck on the 11th January, 1825, died at the expiration of thirty-two hours. The second woman who was thus operated upon by de Siebold on the 25th July, 1825, died on the following day. On the 5th August of the same year, M. Langenbeck, (*Ib.*, t. XVIII., p. 73—*Dict. de Chir. de Rust.*, t. VI., p. 697,) performed extirpation of the womb a second time, and the woman, who died fifty hours after, exhibited, like the preceding cases, indisputable evidences of abdominal inflammation. Of the four patients operated upon by M. Blundell, (*The Lancet*, 1829, vol. I., p. 618,) since the 19th February, 1828, three died, one at the expiration of thirty-nine hours, a second after nine hours, and the third very suddenly, without our knowing precisely what kind of lesions were found upon the opening of the bodies after death. The first case, which had been considered as cured, died a year after at Guy's Hospital from a return of the cancer.

The case of M. Banner (*Journ. des Prog.*, t. XIII., p. 272,) operated upon on the 2nd September, 1828, died on the fourth day of a peritonitis. M. Lizars was desirous of repeating the operations of his two countrymen, and the patient whom he operated upon on the 2nd October, 1828, also died in the space of 24 hours. M. Langenbeck repeated the operation in 1829, and his patient survived but 14 days. On the 26th July, 1829, M. Récamier performed this extirpation for the first time in France. It was to this surgeon that appearances promised the most perfect success from it, but he nevertheless had the misfortune, like M. Blundell, to lose his patient at the expiration of a year. Another case was operated upon by M. Roux, on

the 20th September, 1827, and this one died on the evening of the next day. He had opened into the bladder. Some days after, Professor Roux extirpated the uterus a second time, and death took place at the expiration of 25 hours. M. Récamier again performed it on the 13th January, 1830, and the woman died in 33 hours. M. Dubled, (*Arch. Gén. de Méd.*, t. XXIII., p. 403,) on his part, performed the operation on the 20th June, 1830, and the patient survived but 22 hours. Delpech also, who thought proper to make trial of it, was not more fortunate than the others, and his patient died on the third day. Finally, the English journals have furnished another case, which belongs to M. Evans, and which is said to have succeeded; but I do not possess a sufficient number of details on this subject to dwell upon it at greater length. A patient operated upon by M. Granville, (*Journ. des Prog.*, t. XIII., p. 270,) had a return of the cancer. Without comprehending, therefore, in the above list, the doubtful cases of Monteggia, Osiander, &c., we have, in adding the case of Paletta, whose patient died on the third day, of an intense peritonitis, twenty-three authentic, indisputable instances of extirpation of the uterus, performed during the last 20 years, and out of this number not a solitary permanent cure! Can there be anything in surgery more frightful? and the results of such a melancholy catalogue, are they not of a character to banish this operation forever from practice? Among the dangers which it involves, that of peritonitis is placed in the first line. This inflammation, nevertheless, has not always occurred. The patient of M. Sauter, and those of MM. Blundell and Recamier, who all survived, were not attacked with it, and the bodies after death, in some of those who died in the beginning, presented no traces of it. It is to be added, that in the women in whom death has taken place most rapidly, for example, in less than 24 hours, the peritonitis could not have yet had time to become developed, even though it might have been a necessary result of the operation. Hemorrhage is another accident which is necessarily attended with danger; it occurred in several of the patients, as I witnessed in one of those operated upon by M. Roux, and in another by M. Recamier, and has been noticed also in Germany and England. It has not, however, taken place in the great majority of cases. Some of the women, it is said, died from exhaustion produced by the pain and suffering. The question occurs, why those who escaped the immediate consequences of the operation, and this first and violent onset, have remained in a languid condition, and ultimately succumbed. In their cases the operation could not be charged with having produced either peritonitis, hemorrhage, or pain. The patient cited by Vieussens, who survived 15 years, that of M. Marschall, who did not die until after the expiration of 10 years, and that of M. Langenbeck, who is still living, &c., and in all of whom the protruded uterus was removed, are a sufficient answer to the objection of those surgeons who consider that the patients whom I have just spoken of owed their death exclusively and solely to the extirpation of the uterus.

B. *Indications.*—What chances of success have we from extirpation of a uterus which has become cancerous, and when the operation is performed under the only conditions in which it is admissible? Were we to undertake to describe those conditions, we should find the

it would be a difficult matter, and that their combination must necessarily be a rare occurrence. So long as the cancer has not attacked the whole organ, pure and simple excision, from enabling us to go very high up, ought to be deemed sufficient. It was by means of excision that M. Bellini (*Journ. des Prog.*, t. XII., p. 273,) extirpated the lower half of the uterus in 1828, with entire success. It was also excision which M. Dubled proposed as a substitute for extirpation, (*Arch. Gén. de Méd.*, t. XXIII., p. 142.) When, on the contrary, the disease has involved the whole organ, how can we be sure that it does not exist in any other? It is certainly very true, that the finger successively introduced into the vagina and rectum, while the other hand rests against the hypogastrium, will frequently enable us to conjecture that there may or may not exist some decided degenerescence in the pelvic cavity, in the region of the ovaries, or Fallopian tubes, or in a word, in the connections or neighborhood of the uterus; but under this point of view, the most skillful surgeon can only acquire probabilities of greater or less force, and never absolute certainty. How then, with such data, can we decide upon performing an operation so formidable! Upon the supposition even that the womb only is affected, it would be necessary at least that it should have preserved its natural mobility, and be free from morbid adhesions, without which the operative processes at present known would be scarcely admissible. But so long as it remains in this state, it is not probable that the cancer has attacked it throughout its whole extent, and then the idea of excision suggests itself to the mind. How also can we decide, when the disorganization is not very far advanced, that the body of the uterus is actually in a cancerous condition, or that it is a little larger or a little less than in its normal state, seeing that we have no other means of judging than by the fingers, through the walls of the belly, rectum, or vagina?

C. *Operative Methods.*—Two principal methods have been proposed for extirpation of the uterus, one which may be called the *hypogastric*, the other the *infra-pubic*.

I. *By the hypogastrium.*—To believe Musitanus, extirpation of the uterus at the hypogastrium is far from being a new operation. This author, in fact, on the authority of Wier, asserts that a girl who was excessively libidinous was operated upon in this manner by her father, who made an incision at the lower belly, and through this wound reached the uterus, which he instantly excised. But it is probable that the peasant mentioned by Musitanus confined himself to the removal of the ovaria without disturbing the womb itself, in the same way as the operation is performed upon the female of domestic animals. The same remark is applicable to the passages in Aetius, Schurigius, &c., where we find it mentioned that surgeons had opened the belly in certain women in order to extirpate the uterus. However this may be, the hypogastric method was described and distinctly recommended in 1814 by M. Gutberlat, (*Rust's Handb. der Chir.*, vol. VI.) M. Langenbeck I believe is the first who ventured to apply this method on the living person. Slightly modifying the process of Dr. Gutberlat, he deemed it advisable first to open the peritoneum through the vagina, in order to be more certain of avoiding the bladder. This method was made trial of in France by Del-

pech. If it were ever possible to demonstrate that large openings in the walls of the belly could be unattended with danger, there is no doubt that the hypogastric method improved would ultimately render extirpation of the uterus quite an easy matter. But to combine it with the infra-pubic method is not the way to secure its adoption, any more than the incision in the perineum, as proposed by F. Côme, was calculated to give popularity to the operation of lithotomy by the high method; we have enough already with one of them, without endeavoring also to combine them both together.

II. *By the vagina.*—Out of twenty-three known instances of ablation of the uterus, twenty-one have been effected by penetrating from below upwards. M. Sauter being unable to bring down the organ as Osiander did, divided as he continued upwards, and by means of small cuts, the vagina on the anterior surface of the neck, succeeded by this mode in effecting the anteversion of the uterus, and was thus enabled to separate in succession the two broad ligaments, and to terminate the operation by gradually isolating the uterus from the rectum. MM. Hoelscher and Siebold operated nearly in the same manner. In one instance, however, the last mentioned surgeon was obliged to incise the vagina laterally in order to facilitate his movements and the introduction of his hands. M. Langenbeck commenced by incising the perineum from before backwards; he then divided the vagina behind, in front, and on its sides; and finally grasped the uterus at its fundus and completed its separation by a careful dissection. M. Blundell detaches the vagina posteriorly, and penetrates in this manner into the recto-uterine fossa of the peritoneum; afterwards seizes the fundus of the uterus, retroverts it, divides the broad ligaments and terminates by separating it from the bladder. M. Banner preferred turning over the organ upon its side, after having detached it behind and in front and from one of its broad ligaments, rather than reverse it upon one of its faces. He terminated his operation by dividing the other broad ligament. The incision of the perineum introduced in practice by M. Langenbeck, was extended as far as to the rectum by M. Lizars, who then divided the vagina on the two faces of the diseased organ, before reversing it. M. Récamier and M. Roux have followed with two modifications the process of M. Sauter. If it were possible to introduce one of the tractor instruments above mentioned, M. Recamier would recommend its employment, but if not he would prefer introducing into the uterus the branch having two prongs of an erigne forceps, the other branch of which should have three prongs, and be applied as high up as possible on the outer side of the neck. If this cannot be done he recommends that we should have recourse to Museux's forceps, either simple or articulated, like the common forceps, or bent into the shape of a Z, or merely at a right angle as M. Tanchou proposes, at the outer third of their handle, in order that the parts may not be too much concealed by them during the remainder of the operation. By means of one or the other of these instruments we are to bring the cancer down as low as possible. A straight bistoury protected by the hand, detaches from below upwards the vagina from the front part of the neck, then from the womb itself, until we arrive very near the peritoneum, which is then to be opened. The bistoury, which is

to be constantly guided by the finger, and operating through the peritoneal opening successively to the right and left, will enable us to detach completely the anterior surface of the organ from the fundus of the bladder, and to expose the roots of the broad ligaments. The forefinger glided above the fallopian tube, readily passes upon the posterior surface of the peritoneal duplicature, enables us to divide from above downwards the entire thickness of this fold as far as to its lower third, and to embrace the remainder of it in a strong ligature. After having done the same on the opposite side, M. Récamier terminates the section of the broad ligaments, reverses the uterus forward, and finally separates it from the rectum, conducting his incision from above downwards. M. Gendrin proposes that the uterus should be successively isolated throughout its whole circumference, and turned upon its axis, rather than reversed, when we have arrived at the end of the operation. In place of applying his ligature below the insertion of the fallopian tubes as M. Recamier does, M. Tarral, (*Journ. Hebdo.*, t. V., pp. 403, 529,) on the contrary, commences by embracing with it the whole of the broad ligament, making use of a curved needle, like that of Deschamps, in order to introduce it, and of his left forefinger and thumb to guide it in its progress. M. Dubled considers, that, after having brought down the uterus as much as possible and detached the adhesions of one of the broad ligaments, to the right and in front, and then posteriorly, and after having passed a ligature below the root of the fallopian tubes, through the lateral ligaments, in order to include their two lower thirds, and to enable him to divide them between the ligature and the uterus, it would be an easy matter to amputate the uterus nearly as far up as to its fundus or superior border, in such manner as to leave the fallopian tubes, ovaria, and round ligaments in their place, and even also without the necessity of opening into the peritoneal cavity. But it is evident that this process has then no more to do with the complete ablation of the uterus, and that it is only an improvement of the method of excision such as it was performed by M. Bellini. This last surgeon, (*Strangulamento uter. porteur.*, &c., 1835—*Méthode pour extirp. l'utér.*, &c., 1837,) who passing posteriorly by the cul de sac of the vagina, applies the noose of a ligature above the uterus, which last he then strangulates from above downwards through the interior of the peritoneum, must necessarily have been arrested by the fallopian tubes and the broad ligaments.

III. To assert now *which process is the best* among all these modifications, would be attended with so much the more difficulty from none of them having been followed by a decidedly successful result, and from the fact that the apparent cures in certain women have been obtained from different processes. Thus the case of M. Sauter, in which the uterus was reversed forwards, survived four months; that of M. Blundell, which survived a year, was operated upon by reversing the uterus backwards; and the patient of M. Récamier, who remained cured for a year, had been submitted to the first process of this author. As to the modifications proposed by MM. Gendrin and Tarral, I do not consider it necessary to discuss their advantages or inconveniences. Moreover, as no person will undertake the operation (if in fact it is ever repeated) without deeply reflecting upon it, it is proba-

ble that every one will consider himself entitled to make still further modifications upon these different methods; so that I should be fearful of abusing the patience of the reader in examining in greater detail those which I have briefly described.

#### ARTICLE XI.—VESICO-VAGINAL FISTULAS.

Vesico-vaginal fistula, notwithstanding its frequency and the accidents it occasions, as well as the repugnance it creates, has not been, up to the present time, (1831,) submitted to but to quite a small number of the resources of surgery. Whether it be congenital, (*Dict. des Sc. Méd.*, t. LVI., p. 303.) or the result of severe parturition, or injurious obstetrical manipulations, or a gangrenous perforation, or a contusion or traumatic lesion of any description whatever, it is nevertheless a disease which but rarely disappears spontaneously; the small vesico-vaginal fistulas only will get well, says Mauriceau, but the larger ones are incurable. The small number of spontaneous cures related by Peu and MM. Blundell, Ryan and Paletta, (Bazard, *Thèse*, No. 190, Paris, 1834,) and the little success that has attended the attempts that have been already made, is not a sufficient justification for the almost absolute silence of our best authors on this subject. Various kinds of remedies, nevertheless, may be had recourse to for this affection.

##### § I.—Suture.

The suture, which must have first suggested itself to the mind, is of such difficult application that but few practitioners have ventured to make trial of it, so that scarcely any mention is made of it in the works which have issued from the school of Paris. To abrade the borders of an opening when we do not know where to grasp them, to shut it up by means of needles or threads when we have no point apparently to sustain them, to act upon a movable partition placed between two cavities hidden from our sight, and upon which we can scarcely find any purchase, has appeared to be calculated to have no other result than to cause unnecessary suffering to the patient. Roonhuysen, who, according to M. Chelius, was the first to recommend the suture, did not make use of it. If I understand the matter correctly, it was his nephew who spoke to him of it, and who considers that after having abraded the borders of the division, we may perforate them and keep them in contact by means of a quill cut in the form of a point. The cures which this method is said to have obtained in the hands of Fatio, Walter and Schroeger, are not supported by sufficiently conclusive proofs to carry entire conviction to the mind. Experiments, however, which were made by M. Nægele, (*Journ. Univ. des Sc. Méd.*, t. VII., p. 160,) in the year 1812, led us to hope that it would succeed, while M. Erhmann has since had a proof of this success in a patient which Flamant confided to him, and the thesis of M. Deyber (*Journ. Hebdom.*, t. IV., p 241) shows us that like this last surgeon he was no less fortunate himself in a second case. The fistula, which was very large in one case and narrower in the other, did not nevertheless cicatrize until after the

separation of the threads and a suppuration, which was prolonged for a considerable period of time, so that the cure did not take place in consequence of the immediate contact of the parts. In 1828, M. Malagodi of Bologna performed it with no less success, and the unfortunate result which it met with in the hands of M. Roux, (*Repert. d'Anat. et de Phys., &c., t. V., p. 147,*) in the year 1829, at La Charité, speaks nothing in reality either for or against it, inasmuch as the symptoms which preceded the death of his patient, were altogether disconnected with those which would naturally belong to the suture; cures moreover, it is said, have since been obtained from it by MM. Hobard, Charnham and S. Cooper.

A. *Interrupted Suture.*—M. Malagodi, after having caused his patient to be laid on the bed and held in the same manner as in the operation for stone, introduced the extremity of his forefinger, protected by a leather finger glove, into the bladder through the vagina and the fistula, and then made use of it as a hook to bring out one of the lips of this last to the vulva, and to exsect its callous portion with a straight bistoury; having done the same for the other side by changing his hand, he then attended to the insertion of the threads. M. Malagodi, for the second stage of the operation, again seized one of the borders of the wound as before, with the left forefinger, introduced near its posterior extremity a small curved needle, at the distance of two lines outside of it, brought this out by a circular movement from the bladder into the vagina by making it pass through the vesico-vaginal septum, and was thus enabled to disengage it immediately afterwards. The second needle, fixed at the other extremity of the ligature, was also introduced through the fistula and brought out from the bladder to the vagina, to be disengaged like the preceding. The surgeon applied a second and then a third thread in pursuing the same method, then knotted them separately in such manner as to effect an exact coaptation, and terminated by cutting their extremity near each knot with the scissors. A catheter was kept in the bladder and the patient made to continue in bed. During the first and succeeding day the urine ran wholly through the catheter, but on the third it was perceived that some few drops of it had passed into the vagina. The two posterior points of suture had succeeded perfectly. A single one, that which was nearest to the urethra, had torn out from the tissues, but it was not deemed advisable to reinsert it. *Cauterization* with the nitrate of silver, repeated at different times, terminated the cure, which was completed at the expiration of a few weeks.

B. It was the *twisted* and not the simple suture to which M. Roux deemed it advisable to give the preference. In order to abrade the fistula he made use of forceps very nearly similar to the disc of chimney tongs, after the half of the disc had been removed. One of the lips of the perforation having been grasped by this instrument, M. Roux was enabled to exsect it by means of a bistoury, and could have done so also with a long pair of scissors. The suture was passed from the vagina into the bladder, and first through the left lip by means of a curved needle and the ordinary needle-holder. This needle was then brought from the bladder into the vagina through the other lip of the fistula, then drawn to the outside, dragging after

it through the two lips of the wound a small metallic stem, fixed at the extremity of the ligature. Three of these were successively inserted with the same precautions; after which the noose of a ligature, passed upon the first needle, adjusted and crossed successively on each of the others, as is done in harelip, allowed of the approximation of the bleeding surfaces, and finally the completion of the twisted suture. Symptoms of intermittent fever, and afterwards of functional derangements of the brain, and of inflammation of the peritoneum and pleura, began to show themselves after the lapse of a certain time, and became so serious that this woman died in the space of about twelve days. Upon opening the dead body there was found a considerable enlargement of the fistula, the lips of which had in no place contracted the slightest adhesion together.

C. The *method* adopted by *M. Schreger*, though less judiciously arranged, had nevertheless less unfortunate results. It has been incorrect, however, to state that the cure was complete; the suture was performed three times; and the words of the author himself sufficiently point out that the patient was not cured after the third application: "I was satisfied," says he, "that the wound was perfectly cicatrized, *except for about the space of a line*, where it was difficult to incise the borders. The patient found herself considerably better, and I had even flattered myself that I should obtain a perfect cure in a fourth trial, when indispensable matters obliged her to leave Erlangen."

D. The condition of the female operated upon by *Dugés*, (*Bull. de Ther.*, t. II., p. 145,) was rendered worse, rather than ameliorated, by the suture. Nor did the young girl, who was sometime in my department at La Pitié and upon whom *M. Robouham* made similar trials, derive any decided advantages from them according to what *M. Mondière* tells me, who was present at the operation. It is useless therefore to enumerate in this place the details of the process employed by these practitioners. Unless the fistula be extremely large, the forefinger cannot seize its lips in the manner of the surgeon of Bologna, nor reach them with the forceps in the manner performed by *M. Roux*. The longitudinal divisions only could be treated with the suture after the manner of these two surgeons. But experience shows that vesico-vaginal fistulas constitute in most cases a transverse fissure, or even a kind of half moon with its concavity forwards, between the urethra and the entrance of the ureters into the bladder.

E. If the instrumental apparatus of *M. Nægelé* was not so complicated, it would certainly offer more chances of success than the preceding processes, though this also is scarcely applicable but to longitudinal openings. But art requires something more simple, for the suture to be generally adopted. *M. Schreger* by abrading, so to speak, only the posterior half of the fistula, and introducing each point of suture at only a line or two from the bleeding borders, considered himself exceedingly fortunate in being enabled almost to effect a complete cure of his patient, and to obtain so successful a result in the three trials he made.

F. *The author*.—Trials made upon the dead body induce me to believe that we should succeed better in adopting the following me-

thod. I cause the patient to be placed upon a bed, or upon a table sufficiently elevated and properly arranged. A round-shaped mattress is placed under the belly, in such manner as to enable her to keep her thighs flexed while lying upon her abdomen. An assistant keeps the vagina dilated by means of a large gutter of metal, horn, or thin wood. With one cut of a straight pair of scissors, I enlarge the fistula a line or two in extent posteriorly, and do the same on its anterior angle with a narrow bistoury, in order to be enabled to seize each lip successively with a good pair of staphylo-raphy forceps, and to excise a strip from them by means of scissors that are straight or slightly curved flatwise. The points of suture are then introduced at three or four lines outside of the abraded surfaces. In order to support the parts, the forceps replace the thumb and forefinger of the left hand, while small needles are introduced through the borders of the fistula in the manner they are inserted by M. Roux or M. Malagodi. Finally, each thread is knotted at the bottom of the vagina by means of the fingers. If the cleft is transverse, a bistoury curved flatwise near its point, and very sharp, and introduced through the vagina, very readily detaches a strip from its deep-seated border, which also is to be kept reversed or depressed by means of an erigne or good forceps.

G. Moreover, if the suture of vesico-vaginal fistulas succeeds with so much difficulty, and constitutes so embarrassing an operation, perhaps we ought to charge it on the imperfections of the instrumental apparatus. At the present day, when by means of the spiroidal needle of M. Colombat, we may in one operation introduce a whip suture in any part of the vagina whatever ; and when by enlarging the urethra with a double lithotome, as M. Sanson has done, in order to enable us to introduce the finger by this route, and to seize the fistula so as to depress it towards the vulva ; and when by means of the needle-holding forceps of M. Bineau, M. Soteau, M. Beaumont, M. Bourgognon, or M. Foratier, we may readily pass such number of points of suture around the fistula as we may desire, without any serious difficulties ; we have, as it would appear to me, a further prospect of effecting cures, and sufficient grounds to justify new trials in this treatment. If, as M. Erhmann, (*Bégin, Elem. de Chir.*, t. I., p. 442,) has successfully done, M. Sanson, who endeavored to close the opening by a sort of pucker ; M. Leroy who had recourse to five or six different processes ; M. Buret who passed his threads by means of a needle, directed along the urethra through the vesico-vaginal septum ; and other surgeons of Paris who have endeavored in latter years to cure vesico-vaginal fistulas by the suture,—have not succeeded, there is reason to believe that the irregularities of the abrasion, or of coaptation, have been the cause of these failures, and that the instruments of M. Coglioso would give greater facility to this stage of the operation. The apparatus contrived by M. Fabbri, (*Memoria intorno alcuni nuovi instrumenti, &c., 1838—Soc. Med. Chir. of Bologna*, vol. II.,) to abrade, approximate, and suture the lips of vesico-vaginal fistulas, whether oblique or transverse, is undoubtedly ingenious, but scarcely adds to the chances of a favorable issue to the operation.

### § II.—*Process of M. Lewziski.—Ligatures.*

Several surgeons, convinced of the difficulties which I have just pointed out, have directed their attention towards another mode of treatment. To bring the posterior border of the fistula at the same time towards the urethra, while its anterior border would be crowded backwards, was the first idea which seemed to open the door to success. M. J. P. Lewziski had endeavored to lay down this principle, in the year 1802. The instrument which he recommends is a flat canula, somewhat curved, and pierced near its extremity with two openings for the passage of a needle, which is also curved. A stilette or spring, enclosed in this canula, is designed for pushing the needle into the passage of the vagina, through the posterior lip of the fistula, as soon as the canula is placed in the bladder. This needle, withdrawn through the vulva, drags after it a thread which is made into a noose or point of suture. After having adjusted several of them in the same manner, they are passed into a knot-tightener, in order to close up the vesico-vaginal opening. This apparatus was not applied upon the patient for whom M. Lewziski had contrived it.

### § III.—*Erignes.*

In 1826, *M. Lallemand* (*Arch. Gén. de Méd.*, t. VII., p. 481,) published a case of ancient vesico-vaginal fistula, cured by means of an instrument, the principle of which has some analogy with that of M. Lewziski. The apparatus of the professor of Montpellier, is composed, in fact, 1st, of a large canula about 4 inches long; 2nd, of a double hook, which is moved in the principal instrument by means of a stem, in such manner as to push it out, or to make it enter into its sheath; 3d, of a circular plate which terminates the other extremity of the canula, and which would hinder, if necessary, this latter from penetrating too deep into the urethra; and 4th, of a cork-screw spring, (*ressort en-boudin,*) intended to draw forwards the small hooks as soon as they are inserted in the posterior lip of the fistula. It is applied also in the same manner as I have just stated in speaking of the process of M. Lewziski. The canula being passed into the bladder, allows of our pushing the two small hooks into the vagina through the vesico-vaginal septum, which latter is supported by the left forefinger. By making a turn of the screw, they are kept in this position; a pledget of lint, or fine linen, designed for protecting the tissues, is then placed between the front part of the urethra and the external plate of the canula; finally, we relax the spring, which acts then at the same time by making traction on the posterior lip with its hooks, and by pressing backwards the lower wall of the urethra by means of the circular plate, or the lint, which serves as its point d'appui. By a mechanism which would be too long for description, we may regulate the stop of the spring in such manner that there will only result from it a moderate degree of pressure, though sufficient for bringing the two borders of the fistula into contact. During the space of three days, everything appeared to M. Lallemand to promise entire success. On the fourth day, some drops of urine having made their escape into the vagina, the instrument had to be removed, and a dark

brown spot was observed upon its lower surface, at the distance of four lines in front of the hooks. The fistula nevertheless, appeared to have considerably diminished in its extent. Another application was now made with the erigene canula, and this time the reunion appeared to be perfect. Nevertheless, some imprudence committed at the expiration of about ten days, enabled the urine to escape into the vagina. A very small disunion had taken place, and the surgeon supposed that he could complete by means of cauterization a cure to which his instrument had so greatly contributed. Sometime afterwards they wrote to him that nothing any longer escaped through the fistula, and that the cure *appeared* to be complete. The operation having been commenced and terminated with the nitrate of silver, the use of which alone counts at the present day several unquestionable examples of success, this fact was in reality much less conclusive than it was at first supposed to be. A similar attempt was made with the same apparatus in the course of the year 1829, at the Hospital Beaujon. The success which was at first anticipated was not sustained, and the patient soon found herself in the same condition of infirmity as before. M. Lallemand, however, (*Arch. Gén. de Méd.*, 2nd ser., t. V., p. 482,) in publishing another case of success, appeared to be very much annoyed with the doubts expressed in regard to his first patient, Mdme. Martin, of Marseilles, who continues to remain effectually cured. The lady, who has been seen at Paris, had deceived him herself, and is the subject of another observation. I received from him, on the 2nd October, 1837, the positive assurance on this subject, that out of 15 or 16 trials, he had obtained six or seven cures, two of which moreover have been published by M. Deville, (*Thèse*, No. 107, Montpellier, 1833.)

#### § IV.

The instrument which *Dupuytren* used in one instance with success, and which is a sort of large cannula, or female catheter, has on its sides two opercula or guards, which open like two wings, or shut up entirely, according as we draw to the outside, or push inwards a central stem in the form of a spring, which performs the office of moving them. It is introduced shut up in the bladder. The opercula being once opened and fixed in their place, we then make traction upon the instrument towards us, as if for the purpose of withdrawing the whole of it. From the guards preventing it from being withdrawn from the urethra, it brings with it in front the posterior lip of the fistula, while the lint or linen placed between the urethra and external plate of the canula, enables it to crowd the urinary passage backward. This process, which has neither the inconvenience of perforating or lacerating the vesico-vaginal septum, and which moreover is infinitely less complicated than the preceding, would without doubt be soon decisively adopted, if it was in reality calculated to effect the perfect coaptation of the borders of the fistula; but this is not the case, and I doubt if it can be used in any other way than as an adjunct to cauterization.

### § V.—*Process of M. Laugier.*

If the suture is rarely applicable except to longitudinal fistulas, it is evident that the erigne canula in its turn is only suitable to transverse fistulas. M. Laugier, with the view of obviating this difficulty, and to make the method of M. Lallemand applicable to all kinds of fistulas, has had constructed an erigne forceps, which is jointed after the manner of a Smellie's forceps, and the form of which is modified according to the kind of fistula. If the case is one of a transverse fistula, the prongs of the instrument are bent into an angle on one of its sides directly upwards, one to the right, and the other to the left. In longitudinal fistulas, on the contrary, the two hooks of each prong must be parallel to the axis of the body, while the extremity which supports them is bent into an angle on the border. Finally, we should bend the forceps obliquely, if the fistula itself had this intermediate direction. The hooks of this forceps, says M. Laugier, should be very short, in order that they may not go through and through the vesico-vaginal septum. They are introduced through the interior of the vagina, and not through the bladder. Those of one of the branches are inserted at some lines outside of the fistula, which has been previously abraded. Those of the other are applied in the same manner on the opposite side; after which they are approximated by shutting up the forceps. In order that this approximation may be graduated, augmented or diminished at pleasure, a screw is made to pass through the two handles of the forceps, nearly in the same manner as in the enterotome of Dupuytren. The whole is protected by means of lint, properly arranged in the interior of the vagina, or at least in the opening of this passage. The process of M. Laugier, whenever it has been put in practice on a living person, has always failed up to the present time, and I doubt if it in reality possesses any great degree of efficacy. It is difficult to conceive, that upon a partition so movable, simple hooks would be sufficiently steady to keep in exact contact, during the space of three or four days, the two lips of a fistula of any considerable extent. If they do not go through the entire thickness of the tissues, these hooks will almost unavoidably slip, while tearing at the same time the vaginal membrane, or the urine will become lodged in the depression left in the bladder, and will not fail to make its appearance on the side of the forceps. If they go as far as into the bladder, would not the openings they make, and which would be enlarged by suppuration before they could be withdrawn, incur the risk of making additional fistulas instead of curing the old one? Then also, the contour of a vesico-vaginal fistula is far from being always of the same thickness on all its different points. Those for example, (and these are incomparably the most frequent,) which occupy the termination of the bas fond of the bladder, are in general exceedingly thick in the direction towards the urethra, and very thin on the contrary, behind. It would be necessary, therefore, for the anterior claw of the instrument to penetrate to the depth of two or three lines, while the other would be implanted in a lamella of only a line or half a line in thickness. In longitudinal fistulas the hooks would probably affect only a partial coaptation, since their contour almost always presents some points that are more resistant

than others. Finally, for fistulas that are more remote, would not the suture be attended with more certainty, or would it be much more difficult to execute in practice?

### § VI.—Cauterization.

Cauterization, which at first sight would seem to be only calculated to increase the loss of substance, is, nevertheless, one of the best means which have been made trial of up to the present time. (Monteggia, t. V., p. 339, 1st edit.) Used to the extent of irritating and of inflaming the tissues to a sufficiently intense degree, without effecting their mortification, it produces an engorgement and intumescence, which closes up or contracts, at least for the time being, the opening which we are desirous of healing up. After the subsidence of the engorgement, the exhalation and suppuration which supervene are accompanied with a manifest tendency to coarctation. This, therefore, is a method which deserves all the attention of the practitioner, and one which appears to be especially calculated to succeed where the perforation has but little extent. The cauterization is effected by means of the actual cautery or nitrate of silver. The concentrated acids, and nitrate acid of mercury, which Dupuytren had at first thought of, ought to be rejected. The incandescent iron has the advantage of acting with more rapidity and with greater energy. Unfortunately also, it exposes to the risk of forming an eschar, and of destroying the tissues which we wish only to inflame. The nitrate of silver is generally preferable, and the actual cautery ought not to be substituted in its place, except in some particular cases, as for example, when the borders of the fistula are callous, or cannot be inflamed without too much difficulty.

A. On the supposition that we adopt the *red hot iron*, we must commence by introducing a *speculum* into the vagina. The ordinary jointed speculum is as good as any other. If, however, we should desire to protect the surrounding parts with still greater security, and to leave nothing but the fistula bare, we might make use of a simple cylindrical speculum pierced on its side, or the flute-beaked speculum of Dupuytren, (*Journ. Hebd.*, t. V., p. 256.) This instrument being introduced in such a manner as to expose the fistula to view, we pass into the opening either a probe heated to a white heat, or a small bean-shaped cautery, while taking care to leave it there but an instant, or to apply it a second time if the first cauterization should not appear to be sufficiently powerful. Delpech, who obtained a remarkable cure from this application, thinks that the cautery should not act upon the vesical circumference, but only on the vaginal portion of the fistula, in order, he says, to avoid the loss of substance, while at the same time bringing into full play the tendency to coarctation; this is a remark which the practitioner ought to attend to in the trials which may hereafter be made with this process.

B. In using the *nitrate of silver*, the assistance of the speculum is not indispensable. We should never make use of a simple port crayon to cauterize with this substance. For then it would scarcely touch any other than the inner surface of the vagina, and would in

most cases leave the fistula itself wholly intact. We fasten to the extremity of a dressing forceps a portion of the nitrate, by means of a thread, in such manner that the caustic forms a projection at right angles to the border of the instrument. By means of this forceps thus prepared, nothing is more easy than to introduce the lapis infernalis into the interior of the fistula, and to cauterize the whole of its circumference. A ring surmounted with a small beak destined to receive the nitrate, and which could be guided by the extremity of the finger protected with leather, would perfectly replace the forceps, did it not, like the lateral port crayon, constitute a separate instrument. In whatever manner the cauterization has been effected, it is advisable immediately after to throw up one or more injections into the vagina, and to place the patient in a bath. A catheter should be left to remain in the bladder, and continue open upon the border of a vessel arranged for this purpose in front of the vulva, in order that the urine may escape freely and not be retained. When the inflammation and swelling have ceased, the same operation ought to be repeated. We have recourse to it in this manner four, five, or six times, according to the benefit that results from it, that is to say, until the urine ceases to pass through the vagina. Because the fistula, after being at last reduced to very small dimensions, appears to resist and contract no more, we should be wrong in totally despairing of success, for in more than one instance it has been seen to close up finally at the expiration of a few weeks, though it had appeared to be no longer making any progress towards a cure.

C. Cauterization, either by means of the iron or chemical substances, appears to have obtained a certain number of cures in the hands of Dupuytren. M. Sanson, who was an eyewitness, gives some examples of them. An attentive perusal of the case published by M. Malagodi, also furnishes grounds for believing that in his patient the lapis infernalis probably had more to do with the cure than the suture, and in the other cases where the caustic has been used as an auxiliary or combined with those means which have been considered the principal, it is quite possible this application of itself has procured the results in question. Cauterization, in vain made trial of by M. Earle, succeeded in the hands of M. McDowell, M. Baravero, M. Bellini (*Journ. des Prog.*, t. V., p. 248) and of M. Taillefer, (*Bull. de l' Acad. Roy. de Méd.*, t. I., p. 583,) which latter at the same time made use of the erigene to approximate the borders of the wound.

## § VII.

The method the most ancient and the only one which Boyer treats of, is the one which was improved by Desault. It consists in arranging a catheter permanently in the bladder, at the same time that we keep up in the vagina a cylinder of linen, lint, or what is better, of gum-elastic, in order to make moderate tension upon the angles of the fistula. Desault and Chopart, who were a long time embarrassed with the difficulty of keeping this sound immovable, at last discovered a means of doing so : in place of a double T bandage to which were attached the threads fastened on the extremity of the instrument, and in place of tying those threads to the hairs of the

vulva, these authors contrived a sort of truss, the pelote of which reaches to the mons veneris, and which has at this place a metallic plate curved into an arc, which is made to descend at pleasure on the front part of the pudendum, and which is opened at its extremity to receive the catheter. This however is an apparatus much too complicated, and does not appear in fact to possess much more security or advantage than the one in linen, made use of by other practitioners. Desault and Chopart maintain that they have cured several women by adopting this method, and even furnish a particular example of it. In this example, however, they leave us in a certain degree of doubt, in saying that the woman *appears* to be cured, and not positively that she *is* cured. Moreover, since we are sometimes obliged to wait months and even years to obtain a perfect cure by means of this method, is it not probable that the fistula in such cases disappears spontaneously? If however, we should decide upon employing permanent catheters, it would appear at least that we ought to reject the foreign body, which is placed in the vagina, according to the process of Desault. This, by dilating the passage, must necessarily present an obstacle to the contraction of the fistula.

### § VIII.—*Anaplastic Processes.*

Some modern surgeons, persuaded that the suture and cauterization must necessarily fail in the great majority of cases, have in seeking for another remedy for vesico-vaginal fistulas, proposed the method of anaplasty. I have stated in the first volume of this work, what anaplasty has effected in this respect, by the transportation of a cutaneous plug, or by the Indian method, or that of raising up an arcade from the vagina, or by direct agglutination, and by means of incisions at a certain distance; but I have said nothing of the method of obliterating the vagina, proposed and practised by M. A. Vidal.

### § IX.—*Obturation of the Vulva.*

M. Vidal, despairing of success by the methods in use, proposed to abrade cautiously the vulval contour of the vagina, and to unite the wound by suture, with the view of completely closing up the entrance of this passage. The patient whom he treated in this manner, at the venereal hospital, appeared at first to be doing very well; but in consequence either of the imprudence of a pupil who introduced the catheter awkwardly, or by the action of the bladder itself on the urine, the agglutination was not maintained. M. Vidal, in a second attempt at the Hospital of Necker, did not procure more satisfactory results. The principle of this method, moreover, requires to be farther investigated. The catamenia would be obliged to pass through the bladder, by means of the fistula, in order to make their exit through the urethra. Hence arises a serious inconvenience for those women who have not yet passed the period of life when the menses cease. This obliteration, moreover, as it presents an insurmountable obstacle to procreation, can scarcely be thought of in those who have not arrived at that age at which the genital functions have ceased, except as a dernier resource. The urine, by being obliged, before

making its escape, to fall into and to stagnate in the vagina in the same way as if it were a second bladder, would almost unavoidably deposite there saline matters and lithic concretions, which would soon constitute a real disease. I could not then approve of the method of M. Vidal until after having in vain made trial of all the others. It is to be apprehended, moreover, that it would not be found much more easy to close up hermetically the vulval opening of the vagina than the vesico-vaginal fistula itself. The two trials of M. Vidal furnish already a proof of this. A woman, who in consequence of painful labor had the vesico-vaginal septum ruptured, suffered so much at the vulva that the entrance of the vagina was reduced by degrees to a simple aperture. When she came to the clinique we could readily ascertain, by introducing the catheter into the bladder, the existence of a large opening in the vesico-vaginal septum, while the exterior aperture of the vagina was not more than half a line in diameter. Before acceding to the desire of this woman, who wished above all things to get rid of the vulval occlusion, I endeavored under various pretexts to close the small orifice mentioned, by means of cauterizations either by the nitrate of silver or nitrate acid of mercury, and even by the hot iron, and on one occasion by the aid of the suture, after having abraded the parts; and I must confess that it proved impossible for me to succeed. It must be added moreover, that since the accouchement of the patient, who was about 40 years of age, and which had taken place nearly two years before, she had no longer menstruated, and that consequently we were not enabled to ascertain the obstructions interposed to the flow of the catamenia after the obliteration of the vagina, by the method of M. Vidal.

### § X.—*General appreciation.*

I have now an unpleasant duty to fulfil, in stating that among the cases related of cures of vesico-vaginal fistulas, there are but a very small number which are entirely free from all contestation. It is certain, as M. Jeanselme has shown, (*l'Expérience*, t. I., pp. 257, 270,) in a detailed memoir on this subject, that the cases attributed to Desault by Chopart, to Flamand by M. Erhmann or M. Deyber, and to Dupuytren by MM. Sanson and Paillard, and those ascribed to M. Nœgelé, M. Malagodi, and M. Jobert, and several of those which belong to M. Lallemand, are far from being conclusive.

A. To understand ourselves on this subject, and to enable science to advance in a proper manner, it is necessary to divide urinary fistulas in women into three classes. Those which cause a communication between the urethra and the vagina, may be treated successfully by cauterization or the suture. There is every reason to believe also that a certain number may be cured by adopting the precaution of catheterizing the woman whenever she is under the necessity of urinating, and by not allowing her to evacuate her bladder herself. I have succeeded in this manner in one instance. In another woman whom I operated upon in 1838 at La Charité, I confined myself to the extirpation of the urethral bridle, which separated the fistula from the meatus urinarius. As the neck of the bladder was not implicated, this small operation was attended with entire

success, and the urine could afterwards be evacuated in the same way as before the disease. The fistulas which are situated at the neck of the bladder or root of the urethra, in other words, those which are established at the expense of the trigonus vesicalis, appear also to be susceptible of a radical cure. Nor do I doubt that many of those patients treated by MM. Lallemand and Jobert, were of this description. There is also every reason to believe that the cures attributed to Dupuytren and others, belonged to this class of fistulas. It was probably from having overlooked this distinction, that several practitioners have felt themselves aggrieved by the doubts which M. Jeanselme in his memoir has expressed in relation to their cases. As to the fistulas of the body of the bladder, there is no fact up to the present time, which proves indisputably that they have been cured. It is true that Levret and Deleurye state, that the depression of the uterus and its neck will succeed in such cases; but we find by the case of M. Horner, (*Gaz. Méd.*, 1838, p. 124,) that tractions made upon the neck of the womb by means of an ephelcometre, have proved insufficient for the cure of those fistulas which have been hitherto treated by this process.

B. It is to be recollectcd, moreover, that fistulas of the body and the bas fond of the bladder, present numerous varieties. In many women whom I have seen, the vesico-vaginal septum was so completely destroyed, that the bladder and vagina no longer constituted anything more than one and the same cavity, that the anterior wall of the bladder, from being no longer supported, descended down as far as the vulva, under the appearance of a reddish-colored fungus, so that it would have been absurd to have thought of curing an infirmity of this description in any other manner than by the method of M. Vidal. I have had an opportunity of examining two women in whom the fistula was so high up that its superior border was represented by the anterior side of the neck of the uterus. Is it not evident that cauterization or abrasion, combined with depression of the uterus, might in these cases have presented some prospect of success? In another woman, the fistula, which was at the bas fond of the bladder, and of a circular form, was situated in such manner external to the mesian line, that it could be closed up quite entirely by means of slight pressure made through the vagina.

C. *For the future*, therefore, it will be advisable not to cite cures of vesico-vaginal fistulas, without actually defining their precise seat, form, and dimensions. This, it would appear, is what is required by M. Jeanselme, and I consider that an advantage would be derived from it in practice. In conclusion, however, I would remark, that uretro-vaginal fistulas yield without any great difficulty to the resources of art or the salutary efforts of nature; that those of the trigonus-vesicalis rarely disappear when they have more than eight to ten lines diameter; that those that are the highest up in the vagina also do not appear to be absolutely incurable; but that in regard to those of the bas fond, I feel myself compelled, without being as wholly incredulous on this subject as M. Jeanselme, to avow, notwithstanding, that there is reason to call in question almost every one of their alleged cures which have been published up to the present time.

### § XI.—*Palliative Treatment.*

Where the case is incurable, an oval ball of gum-elastic is one of the best remedies to make use of. The means then to be used are no longer designed for any other purpose than that of cleanliness, and to protect the organs against the acridity of the urine, or to receive this liquid, in such manner that the patient may be incommoded by it as little as possible. For this purpose J. L. Petit had an instrument constructed which he called the *trou d'enfer*, and which, according to him, fulfilled the intention perfectly; but as he has not described it, we have not been enabled to derive any advantage from it since; fortunately that of Féburier, and which is met with in most of the gum-elastic instrument-shops, leaves nothing to desire on this subject; it is a *sort of cup* made of caoutchouc, which may be kept in front of the vulva, and prolonged into the vagina without preventing the woman from walking or attending to her usual occupations. M. Barnes, who in consequence of the frequency of vesico-vaginal fistulas among English women, has been frequently obliged to direct his attention to this subject, makes use of an elongated gum-elastic bottle, which can be adjusted in the vagina, and which has on its anterior face an opening in which a sponge is introduced and applied to the fistula in order that the urine may gradually pass into it. The patient withdraws the whole two or three times a day, expels the urine by simple pressure, which, acting on the sponge, empties the instrument completely. M. Guillon and Dugès have each contrived an instrument which may be considered as an improvement of that of Barnes. Finally, if none of these means are at command, the only resource which the woman would have would be, to make use of portions of *fine sponge, dry linen* and silk paper, which would have to be renewed a greater or less number of times daily. The semiflexed position on the belly, as recommended by M. Chailly, (*Transact. Méd.*, t. VI., pp. 283, 293,) with the view of forcing the urine to escape by the urethra, with the catheter or aspirating syphon which was to be introduced to prevent the urine from passing through the fistula, has in the first place the inconvenience of not effecting its object. In the next place it is impossible for most women to keep it up over a day or two. M. Schraeger and M. Sanson, who made use of this process a long time since, derived no benefit from it and were soon deterred from its employment by the sufferings and the sores that it was calculated to produce upon the knees, elbows and spines of the ilium.

[*Vesico-Vaginal Fistulas.*—M. Berthe of Gay, (*Arch. Gén.*, Août, 1844, p. 511,) states that he has cured three fistulas of this description by cauterizing, with the cautery at a white heat, which he was enabled to accomplish effectually by making the borders of the fissure project freely into the vagina, by keeping the bladder constantly distended with air during the operation.

Even the great destruction of the vesico-vaginal septum from difficult labor, did not, in our opinion, justify the severe operation of M. A. Bérard (*Arch. Gén.*, Sept., 1845, p. 77, &c.) in attempting to alleviate the difficulties by dissecting a circular mucous diaphragm or flap behind the nymphæ, drawing that backwards and then bring-

ing the abraded surfaces, both of the flap and of the parts from which it was removed, into coaptation, (the latter by the quilled suture,) so as to obliterate the vagina both in front and behind by a species of *infibulation*. Death followed as a matter of course.

In regard to the *obliteration of the vagina* as a remedy to the distressing annoyance from the urine in cases of extensive vesico-vaginal fistulas, M. Velpeau, like most other surgeons of experience, disapproves of this operation, which has been attempted by MM. Vidal, A. Bérard, &c., but *now* contends (*Arch. Gén.*, 4e sér., t. VII., Mars, 1845, pp. 370, 371) that it is not so alarming as some think, and that the objection raised on account of the obstruction to the escape of the catamenia through the small aperture left, is unfounded, inasmuch as the menstrual fluid, from not being coagulable, can as readily flow through this aperture as the urine does. See text above T.]

#### ARTICLE XII.—RECTO-VAGINAL FISTULAS.

The posterior wall of the vagina, like the anterior, is exposed to the risk of being lacerated during parturition, cf being contused by the head of the foetus and branches of the forceps, and of being perforated by abscesses, gangrene, &c. A young woman at the Hospital of La Charité, who was completely destitute of a recto-vaginal septum, insisted that the perforation was produced during coition, and I have had communicated to me a similar fact; but I am induced to believe that the infirmity in these cases has been congenital, and that the women under such circumstances have been desirous of concealing it. This species of fissure or fistula, however, without being exceedingly rare, has not been as frequently observed as vesico-vaginal fistulas; without doubt because the friction made behind the pubes by the head of the infant, and the instruments which accoucheurs are sometimes obliged to make use of, compress the bladder with more violence, upon a more circumscribed and more projecting and irregular point of bone than they do on the rectum behind.

##### § I.—*Spontaneous Cure.*

From recto-vaginal fistulas being somewhat more inclined to a spontaneous cure than those of the vesico-vaginal septum, it has very naturally happened that they have been generally overlooked. Ruysch had already mentioned the case of a woman who had an opening in the recto-vaginal septum of an inch in diameter, but who got well without an operation. M. Philippe of Mortagne (*Arch. Gén. de Méd.*, t. XXIII., p. 568) noticed in 1829 a case nearly similar. The patient whom he mentions had an enormous perforation, which made a communication between the rectum and vagina. The most celebrated surgeons of the capital were consulted, and all of them gave it as their opinion that the disease would probably remain incurable, and that they saw no operation that could be undertaken. Means for cleanliness, together with a position upon the side, constituted the whole treatment made use of by M. Philippe. After having become considerably enlarged, the fistula began to contract, so much so that after the expiration of a few months it was found to

be completely closed. At the time the case was published the cure continued perfect and there was no reason to apprehend a return. Analogous cases have been related by Fichet de Fléchy, M. Capuron and M. Deschamps. Sèdillot (*Journ. Gén. de Méd.*, t. 56) had already published a case nearly similar; it differs from it only in this, that the disease belonged to that description which Smellie had in vain endeavored to cure, but which Noel overcame by means of the twisted suture. Unfortunately the system does not always co-operate so kindly with the wishes of the practitioner, and it is but too common to find that lacerations of the recto-vaginal septum persist notwithstanding the best directed efforts. All the means proposed for vesico-vaginal fistulas are equally applicable to this.

### § II.

*Cauterization*, for example, seems calculated to succeed frequently. It is, in fact, ascertained that by abrading the angle of a fistula of this description, by any mode whatever, adhesion rarely fails to take place, at least to the extent of a few lines. In using the nitrate of silver by this process, it would be required to cauterize only at each time the most remote portion or commissure of the fistula. It is nevertheless true that these fistulas do not readily yield, unless they are very small, and that therefore it would be useless undoubtedly to attempt a trial with caustics when they are of large dimensions. A more efficacious resource probably would be found in the erigne forceps of M. Laugier. Injections of red wine effected a cure in one instance, in what manner I do not know, in the space of fifteen days, in a young woman who came into my department at La Pitié, and in whom the fistula had existed for the space of eight months.

### § III.—*Suture.*

The operation which at first sight would appear to present the greatest degree of certainty, is the suture. Only that it is an unfortunate circumstance that it is so difficult of application that we cannot, up to the present time, enumerate but a very small number of cases in its favor. Gardien states that it was unsuccessfully attempted by A. Dubois, and Boyer considers that if all the failures by this process had been published, there would at the present day be a great number made known. It has nevertheless succeeded, and as it is probable that by improving it we may ultimately derive more benefit from it, I consider that it is worthy of further trials. The first cure which was effected by this process, was in the case published by Saucerotte, (*Recueil Period. de la Soc. de Méd.*, t. IV.) The patient had at the same time a perforation of the recto-vaginal septum above the sphincter, and a laceration of the perineum in front of the anus. The surgeon caused the vagina to be dilated by means of a speculum with two branches, and introduced into the rectum, through the anus, a sort of wooden gorget, the convexity of which was placed underneath the fistula, to serve as a point d'appui to the other instruments. The opening being thus exposed to view, Saucerotte excised its borders, one half by means of a bistoury pro-

tected by a bandage, and the other half by a species of cutting rasp. The glover's suture, which he gave the preference to, was applied by means of two curved needles, one which was shorter to begin the operation, and the other longer to terminate it. The forceps and usual needle-holder had been slightly modified for this purpose, that is to say, that their extremity was arranged in such manner that the needle could be fastened in them in any direction. Saucerotte then introduced, by means of this instrument, his first point of suture as far as to the upper angle of the abraded fistula, where he secured his ligature by means of a portion of adhesive plaster, in order that he might dispense with knotting it. He afterwards made with the other needle six turns of spiral or whip suture, proceeding from behind forwards, and secured it ultimately by knotting the two halves of his ligature upon a foreign body. For several days there was reason to believe that the cure would take place, but the woman, who had not had a stool during the time, was then obliged to make use of so much effort to evacuate the hard and lumpy faecal matters, that the suture was thereby torn out, by which the greater portion of these matters escaped through the vagina. Saucerotte, however, finding that the adhesion maintained itself in the upper portion of the fistula, and that the woman herself desired the operation to be repeated, made another trial at the expiration of a month. This time he took the precaution to divide the bridle formed by the sphincter, in order that there might be no obstacle to the free passage of the matters; the case was completely successful. A similar success, it is said, was since obtained by M. Pl. Portal, (*Gaz. Méd.*, 1835, p. 696,) in a young girl four years of age. But a woman who had been already operated upon in this manner unsuccessfully at Clermont, was not more fortunate in the second trial under the hands of M. Roux, (*Mercier, Journ. des Conn. Méd.-Chir.*, Mars, 1839, p. 97.) Noel (*Rec. de la Soc. de Méd., &c.*, t. VII., p. 187) also made use of the suture in a case very similar to that of Saucerotte. The woman had the entire perineum and the anus, and a portion of the septum, ruptured during a protracted labor. He had recourse to the scissors to abrade the two lips of this ancient fissure; inserted several needles, one on a line with the sphincter, and also another at an inch above; secured them by means of threads, as in the twisted suture; kept the thighs together by some turns of bandage which embraced both limbs; and enjoined upon her to keep upon her back, in order to enable the faecal matters to escape by passing along the posterior wall of the rectum, and ascertained to his satisfaction, after having removed his second needle, that the reunion was perfect, not only at this point, but also in the entire upper portion of the wound, where, nevertheless, the suture had not been applied, and the lips of which had not been brought into contact, except by means of the approximation of its lower portion. This cure, which remained permanent, proves that Smellie, in his case, might probably have obtained the same result if he had proceeded more methodically. These two facts, however, belong rather to suture of the perineum than to recto-vaginal fistulas. In a case since published by M. J. Nicols in England, it is perceived that the operator was obliged to repeat the suture three

times. But his exertions were ultimately crowned with complete success.

#### § IV.

*Anaplasty* should be as applicable to recto-vaginal as to vesico-vaginal fistulas. I failed in it however in one instance, in transporting a plug borrowed from the vulva, (see Vol. I.,) and I was not more fortunate in another woman, in compressing with an elastic forceps the two walls of the fistula, the track of which ran obliquely through the tissues of the recto-vaginal septum.

#### ARTICLE XIII.—ENTERO-VAGINAL FISTULAS.

Other fistulas, as those denominated *entero-vaginal*, have also attracted the attention of surgeons. A noose of small intestine, or the sigmoid flexure of the colon when it has protruded into the recto-uterine cavity, may on being perforated, show itself outwards posterior to and above the vagina, as has been seen by M. Roux, (*Arch. Gén. de Méd.*, t. XVII., p. 300,) and also by M. Caza-Mayor, (*Journ. Hebd.*, t. IV., p. 174.) Two very different kinds of operations, both in their processes and in their results, have been devised as a remedy for this description of accident, which, when it happens, constitutes a sort of artificial anus. The patient of M. Roux, a young woman whose fistula had existed for the space of several years, having been admitted into La Charité, was anxious at every hazard to be relieved of her disease. The surgeon considered that he might effect the cure by opening upon the intestines through the abdominal walls. His intention was to invaginate the termination of the ileum, after it had been previously detached from the vagina, into the lower end of the large intestine, and in this manner to re-establish the continuity of the alimentary canal, by means of the suture, according to its modified application in these latter times. This bold attempt was followed by the most disastrous consequences. The patient died, and it was found on opening the dead body, that the gut which should have been placed downwards, had been placed in an opposite direction. The process adopted by M. Caza-Mayor, in his case, though more rational in appearance, and less dangerous, did not nevertheless succeed perfectly, the patient having been suddenly carried off by a pneumonia. The instrument used by this surgeon, is constructed upon the same principle as the enterotome of Dupuytren. It is a kind of forceps, each branch of which is terminated by an oval plate eight lines long, and four lines broad, and having some teeth on its side towards the intestine. Being introduced, one branch through the vagina and fistula as far down as to the perforated gut, and the other through the rectum so as to meet the first, the object of these plates is to approximate and to place in contact the corresponding walls of the two portions of the alimentary tube, to destroy immediately the septum which results from this adossement, and to produce in this part a loss of substance. The forceps in its whole extent was 8 inches long; its branches, which were articulated like a common forceps, left between them a sufficient space to include the entero-vaginal septum and the perineum; while a quick screw which perforated their outer extrem-

ity, allowed of their action being regulated at pleasure. The results took place as the operator had anticipated; the stercoral matters partially resumed their natural course, and everything led to the belief that the fistula in the vagina would have speedily closed, when the woman died, a victim to her indiscretion. It may, in fact, be readily conceived, that when an artificial perforation takes place in the rectum, the foecal matters might partially escape through it; but in regard to a primitive fistula, how can it become obliterated and cease to receive these matters?

#### ARTICLE XIV.—FISSURES AND SUTURE OF THE PERINEUM.

The protrusion of a large sized polypus, or parturition, may sometimes involve among their consequences such extensive lacerations of the perineum as to require the aid of operative surgery. If, as I have seen in many instances, these fissures should be made transversely, or include the fourchette only, they require no attention. Nature herself will effect their cure, or they leave a deformity of too trivial a character to demand the notice of the surgeon. Fissures in the posterior commissure of the vulva on the contrary, and which extend to the neighborhood of the anus, and with still greater reason those which include the sphincter of this opening in such manner as to unite the rectum with the vagina, claim all the attention of the operator. If the extremity of the recto-vaginal septum participates in the fissure, the stercoral matters which frequently then can no longer be retained, actually constitute the vagina into a species of cloaca, and place the woman in the same situation as those afflicted with artificial anus. From the absence of the perineum, the uterus has a constant tendency to descend, and it is found almost impossible to support it by means of pessaries. Impregnation, on this account, is attended with greater difficulties. Parturition itself is scarcely rendered more easy by this circumstance, for it is the osseous strait, and not the perineum, which may oppose an obstacle to the passage of the head of the infant. These lacerations have been observed at every epoch. If they have been in most cases abandoned to the resources of the system, this is because their spontaneous cure, whether complete or incomplete, has not been a very rare occurrence, and perhaps also because the surgical means which have been used up to these latter times did not possess any great degree of efficacy.

##### § I.—*Spontaneous Cure.*

Thymœus had already mentioned that a woman who had her perineum completely lacerated, had recovered without any kind of treatment. Peu affirms that a patient whose perineum was ruptured to such extent as to render her incapable of retaining her stools or the injections, was nevertheless perfectly re-established; but it is proper to add that De la Motte, who alleges that he saw this woman thirty years afterwards in Normandy, maintains that she was not at all cured. Mauriceau, in speaking of the suture, confines himself to recommending to women that they should no longer bear any children. Deleurye says positively that these large solutions of conti-

nuity do not require the suture. A perineum lacerated as far as the anus is, says Puzos, an unfortunate accident; but by keeping the limbs together by means of a bandage, women may, he says, be cured full as well as by the suture. Aitken considers that the suture is never admissible in such cases. In this he is supported by M. d'Outrepont and some other modern accoucheurs. A cure it is said was obtained by this process in one instance by Trainel, (*Journ. Gén. de Méd.*, t. IV., p. 427.) It would be going too far, therefore, to say with M. Roux, that no one has ever seen reunion effected in these cases by the efforts of nature alone. This reunion was so complete in a case related by Trinchinetti, that it subsequently became necessary to incise and dilate the entrance to the vagina to allow of copulation.

## § II.

The *suture*, nevertheless, which has frequently been made trial of unsuccessfully, and again in our time by A. Dubois, and by M. Paul Dubois in two different cases, and afterwards by another practitioner quoted by M. Blundell, has often succeeded. Guillemeau, who had to treat in this manner a laceration prolonged as far as to the anus, made use of one point of twisted suture and cured his patient in fifteen days. De la Motte, who considers the suture infallible, placed three points in one case, one on the recto-vaginal septum, one on the perineum near the anus, and the other in the neighborhood of the fourchette, and succeeded without any difficulty. M. Morlanne, by proceeding in the same manner, was no less fortunate in a similar case. The same was the case with M. Montain the younger, who had recourse to the quilled suture; with Osiander, who cured his patient with the simple suture; with Dupuytren, whose case was not published until the year 1832; with M. Rowley, Mursina, Mentzel, (*Roux, Restaur. du Perin.*, p. 12—*Institut. Sav. Etrang.*, t. V.,) and M. Dieffenbach; so that, including the case in the *Ephemerides Curiosorum Naturæ*, science already possessed at least ten examples without adding those which M. Meissner attributes to Churchill, Alcock, and Zang, before M. Roux again drew attention to this subject. M. Busche extols especially the method of M. Dieffenbach, who, together with the simple suture, made a long arched incision on each side of the laceration. A rupture of the recto-vaginal septum was cured by Laugier by means of a simple suture, as in the case of Saucerotte, which last gave the preference to the glover's suture. Without considering the *twisted suture* indispensable, I am, nevertheless, of opinion that this is the one that deserves the preference in every case where there is no special indication to the contrary. This is the one that M. Roux has made use of in all his patients, while in the only case in which this practitioner employed the twisted suture, he failed (*Restaur. du Perin.* &c., p. 16.) He counts at the present day thirteen cases. It must be remarked, however, that two of his patients died, in one of which (*Ibid.*, p. 36,) there was only a partial rupture, while the other, on the contrary, (*Ibid.*, p. 27,) was placed under very unfavorable circumstances. M. Roux, who imputes the rupture of the perineum in this last woman to an operation for fistula in ano, allowed himself to be imposed upon by false statements of the

case. It was in my department at La Pitié where this case had been received, and while there she appeared to me to be so extensively ravaged by ancient syphilitic ulcerations, that I confined myself to excising one of the bridles which obstructed the anus, without deeming it advisable to pay any attention to the laceration of the perineum. Having rectified this error in my Treatise on Accouchemens in 1835; I had reason to be astonished to see it repeated in 1839 by M. Roux, (*Ibid.*, p. 27,) and by M. Mercier, his pupil, (*Journ. des Conn. Med.-Chir.*, Mars, 1839.) I will remark, moreover, that in two other patients he found it necessary to repeat the operation. A lady of New Orleans, also, who had been unsuccessfully operated upon by M. Roux, had the disease return, but was unwilling to undergo another trial. Moreover, it has been performed at the present day by other surgeons; M. Convers, among others, (*Gaz. Méd.*, 1835, p. 44,) has employed it in one instance with success. I myself have had recourse to it in two cases; one was cured and remains in good health; in the other death was caused by a peritonitis at the expiration of thirty days, though the perineum had become perfectly agglutinated. A patient whom M. Mercier states that he operated upon, (*Journ. des Conn. Med.-Chir.*, Mars, 1839, p. 94,) a short time after the accident, also died. A circumstance which is not to be overlooked is this, that after the reunion there remains quite frequently a kind of fistula at the lower part of the recto-vaginal septum. M. Roux asserts (*Restaurat. du Perin.*, &c., p. 24,) that this opening continued for a long time in the wife of the surgeon of Valogne. It also continued open, (*Ibid.*, p. 31,) he says, in another patient, after which he saw no more of her. M. Roux, in asserting that this opening has, in almost every instance, ultimately become obliterated, or so narrow (*Ibid.*, p. 34,) that it no longer admitted the escape of anything but a small quantity of gas, does not thereby prove that it has in reality completely closed up. I find, in fact, in the thesis of one of his pupils, (Ramon, *Thèse* No. 332, Paris, 1837,) that it quite frequently remains open. I know a lady operated upon by M. Roux in whom this fistula has not diminished any since the year 1834.

In conclusion, lacerations at the vulva should be divided into two classes: those which extend only to the neighborhood of the anus, but leave intact the sphincters and the recto-vaginal septum, constitute the first class; while the second comprises all those ruptures which completely unite the anus and vagina, and which encroach more or less upon the septum. When the accident is recent, whatever may be the species of rupture, it is not proper to have recourse to a surgical operation; we must then confine ourselves to the approximation of the thighs, and to repose, and also to the keeping of the bowels open and to various means of cleanliness. The tumefaction and congested state of the parts, would not allow of the suture succeeding under such circumstances. I once had recourse to it in a case of this kind and it failed completely. If, at the termination of a month or two, the rupture has not reunited, nothing more is to be expected from the efforts of the system; but we must wait until the woman has recovered her strength, and until the lips of the wound have cicatrized separately. We have then to ask ourselves the

question, which is the preferable kind of suture. It is certain that the simple suture would succeed in a very considerable number of cases, even where there was a rupture of the entire perineum. De la Motte, contrary to the assertions of M. Roux, has positively used this suture with entire success. I have already said that it was no less efficacious in the hands of M. Morlanne. Nevertheless, if the simple or twisted suture in reality answers in cases of partial rupture, as is proved, moreover, by the numerous examples of episiotomy published by M. Fricke, and by my own cases, it is also certain that where the rupture is complete this suture, in many cases, will be found to be uncertain or insufficient.

A. *Partial ruptures.*—Those fissures of the perineum, which stop in front of the anus without including the recto-vaginal septum, do not disturb the functions of the rectum, but they favor the descent of the uterus, and may be attended with unpleasant consequences in respect to the conjugal relations and duties. It is allowable, therefore, to undertake their cure when this is desired by the woman. In these cases the twisted suture, or better still, the simple interrupted suture, will almost always be found sufficient, and possesses scarcely less efficacy than the quilled suture.

I. *The woman* should be *placed* in the same way as for the operation for lithotomy. The surgeon being in front, and either seated, standing up, or on his knees, begins by abrading the borders of the fissure. For this purpose he removes from it a pellicle, commencing at the neighborhood of the anus, and proceeding to the distance of an inch and a half or two inches in front. The excision should be carried through the entire depth of the fissure, from the cutaneous tissue to the inner membrane of the vagina; we should take care also that all the points of the periphery of this fissure are completely rawed, without excepting the lower extremity of the posterior column of the vagina, which in such cases usually makes a very considerable projection at the deep-seated border of the wound.

II. After having wiped off the blood, which sometimes flows out in considerable abundance, the surgeon inserts the threads, one behind in the direction of the anus, another in front towards the nymphæ, and the third at the middle portion. For this purpose, beginning almost indifferently with the first or the last, he seizes and plunges in from without inwards, and with his right hand, a curved needle through the left lip of the wound, taking care to enter at from four to six lines outside of the bleeding surface, and to come out very near the mucous tissue. A good pair of forceps, when the fingers of the left hand are not found sufficient, will serve to support the tissues while they are being thus perforated. The needle is then immediately conducted with the same hand from within outwards, and from the bottom of the wound, through the other lip of the division, in such manner that it may come out through the skin at the same distance from the abraded tissues. We proceed in the same manner for the introduction of the second and third thread. I would however remark, that it would be possible, if we begin by the upper thread, to make traction upon its two extremities, in order to give tension to and to approximate the division, so that by placing the two fingers of the left hand outside of this division, as if for the purpose

of pinching up its sides, we would be enabled by one movement to introduce the needle through the entire thickness of the tissues, which are to be embraced by the suture. It is also important that the middle thread should comprise in its noose the abraded extremity of the posterior column of the vagina, at the same time that it includes the sides of the wound.

III. Having arrived at this point, the operation has no longer anything remarkable; each of the threads is knotted on one side by a simple knot supported by a bow, and in such manner as to exercise a certain degree of constriction on the parts. In case the *twisted suture* should have been preferred, we would have nothing more to do than to introduce each of the needles or strong pins, with the same precautions, or in the same manner as in the preceding case. Afterwards throwing a noose of thread round their extremities, we would proceed in the same manner as has been described in treating of twisted suture in general, except that their points and heads would have to be afterwards carefully protected and raised up, because of the perineal groove where they are obliged to remain imbedded. As the *quilled suture* does not require any other rules under these circumstances than in the following case, it is unnecessary to dwell upon it at this time.

IV. *Subsequent treatment.*—In order that the operation may succeed, the woman is required to remain for a week at least at rest, with her thighs kept together, and not to evacuate her urine spontaneously. It is advisable also that she should not be compelled to go to stool, and that the perineal region, though not requiring any covering, should be cleansed and carefully washed several times a day. A catheter left in the bladder irritates and fatigues the patient too much; it is better to introduce it every eight or six hours. A meche in the anus is only calculated to jeopardize the success of the operation. Nor does the one which could be introduced through the remainder of the vulva, or through the anal angle of the wound, into the interior of the vagina, appear to me of any more utility. Nor are the lateral incisions, which are made by M. Dieffenbach under these circumstances, any more indicated in these cases; for the tissues are naturally so pliant that it does not become necessary to make any great degree of traction upon them to bring the lips of the wound into exact coaptation. The reunion is usually so far advanced at the sixth day, that the ligatures, which are then generally loose and movable, may be divided and withdrawn without any inconvenience. Before doing this, however, it is well to encourage a stool by means of one or two glasses of Seidlitz water, in the same way as we should in the beginning have dissuaded from any inclination of this kind by means of opiate preparations. Some days more are still required to consolidate the agglutination of the parts, and it would be dangerous to allow the woman to separate her thighs or legs entirely before the tenth or twelfth day. Injections into the vagina, and lotions externally, with emollient, detergent, or antiseptic liquids, would be advisable, during the first days after the operation, if purulent or other matters should have accumulated in quantity in the vagina or upon the perineum.

V. *Dangers.*—However simple and innocent this operation may

appear to be, it nevertheless sometimes exposes to the risk of serious accidents. Two ladies upon whom it was performed, were seized on the third day with a hemorrhage, which continued in one of them to the termination of the second week, and which in both of them was sufficiently copious to cause repeated syncopes, and to give me serious alarm. Notwithstanding which, no artery of any importance had been opened, but the blood escaped by exhalation; but I could not assert that it came rather from the bottom of the wound, than from the inner surface of the vagina or uterus. A young woman who was operated upon in this manner, and who did very well until the tenth day, was then attacked with obscure pains in the bottom of the pelvis, and soon after with a peritonitis, which ended in death.

B. *Complete Ruptures.*—It was for cases principally in which the perineum was completely ruptured, that M. Roux proposed the quilled suture. This surgeon having failed with the simple suture, in one instance in which he used it, supposed that this result was owing to the circumstance that the bottom of the parts had not been kept in perfect contact; from that time, his method has not changed. The woman is placed and supported in the same manner as for the suture of partial divisions. The abrasion of the parts is effected also in the same way, and with the same precautions. It is necessary, moreover, that it should be performed upon the anterior half of the anus, and the border of the recto-vaginal septum. The threads should each consist of a ligature two lines broad, terminated on one end by a noose. The other extremity is inserted through the eye of a long, strong curved needle, with a very sharp cutting edge. They are plunged in and brought out at 6 or 8 lines distance from each side of the wound. We must commence with the ligature that is nearest to the anus, so as to endeavor to comprise the extremity of the septum in its noose. The two other ligatures are to be made to pass as near as possible to the mucous membrane of the vagina. The second stage of the suture consists in adjusting the supports (*chevilles*), and knotting the threads. We pass therefore, for this purpose, the end of a gum-elastic sound or bougie, which is of an exact cylindrical shape, into the noose of each ligature which has been left expressly for that purpose, on the left side of the rupture. We place another on the opposite side, between the two separated halves of each of the same threads, in order that by means of a simple knot, the two cylinders may be approximated together, while they compress in a uniform manner the bottom of the two sides of the division throughout its whole length. These last knots being each fastened by a bow, complete the quilled suture. In order to remedy the swelling and separation even of the lips of the fissure on that portion of the integuments which is not supported, we pass around the cylinders, and in the interval of each point of suture, another thread, the two halves of which are to be crossed in front of the wound before knotting them on one of its sides. We have in this manner all the advantages of the simple with those of the quilled suture. The needles made use of by M. Roux, from being uniformly curved into half circles, do not penetrate the tissues without difficulty, and are not of very easy application. M. Vidal, in fact, has devised others which are much more convenient; they are merely common needles, almost straight, with

an eye near the point to receive the ligature. After having inserted them as I have said above, through the left lip of the wound, he disengages the thread from the eye, and withdraws the needle; then inserted from without inwards, through the right lip, this needle again arrives into the bottom of the wound, to be armed there with the ligature, which it brings out in returning from it. The rest of the suture has nothing further of a particular character. As to myself, having made use of ordinary suture needles of some strength, I have found their application so convenient that I have had no occasion to think of making trial of others. It would appear to me, however, that for penetrating a considerable thickness of tissues, M. Vidal's needle would possess some advantages over those of M. Roux. In whatever way the quilled suture has been applied for complete ruptures of the perineum, it requires precisely the same precautions as those which I have described above. It is better in all cases to encourage a few stools by means of a laxative rather than by injections, and on the day before dividing the threads rather than immediately after.

### § III.—*Process of Montain.*

M. Montain, (*Therap. Med.-Chir.*, p. 46, 1836,) notwithstanding the success he obtained in his first trial with the suture, has since treated ruptures of the perineum by another process. He makes use for this purpose of a long clasp, the two branches of which are each armed with points which are to perforate respectively the previously abraded lips of the division, and are afterwards approximated with all the force or moderation that may be required, by means of a transverse screw. But this clasp, which could only be accurately applied to fissures of the recto-vaginal septum, would soon become insupportable, even in such cases in the greater number of women. There is no probability therefore of its being retained in practice.

### § IV.—*Cauterization.*

Some surgeons, and M. J. Cloquet among others, with a view of avoiding anything like a bloody operation, have treated ruptures of the perineum by cauterization, as I recommended in 1832, and as Sédillot had already done; by applying a small cautery heated to a white heat, or a crayon of nitrate of silver, or a pencil wet with nitrate acid of mercury into the deepest angle of the division, and repeating this at least once a week, I supposed that the fissure would be gradually closed from its upper part toward the integuments. Though cures have been related in support of this practice, I fear that there has been some delusion in regard to it. The recto-vaginal septum treated in this manner is depressed and becomes hardened and approximated to the skin, but the rupture of the perineum itself does not approximate, nor fill up, nor close; so that we diminish the deformity without destroying it.

### § V.

*After the cure of ruptures of the perineum, it may happen that the vulva will be found to be too narrow, as in the young female*

who after her delivery, while she was unmarried, was operated upon by Dupuytren, (*Gaz. Méd.*, 1832, p. 685—Pigné, transl. of Chelius, t. I., p. 262,) and afterwards appeared to have a hymen which presented a resisting obstacle too much for her husband! In such cases, graduated dilatations and emollient ointments will almost always be found sufficient to enlarge the opening. We should not consequently have recourse to the scissors or bistoury unless there was an extreme degree of contraction.

### § VI.

To divide the sphincter behind, as proposed by M. Mercier, (*Jour. des Conn. Méd.-Chir.*, March, 1839,) with the view of relaxing the parts and giving greater facility to the stools, and of avoiding all kind of traction upon the suture, is a mode which might also be attempted in serious cases.

## ARTICLE XV.—DYSTOCHIA, (DIFFICULT PARTURITION.)

The operations which are sometimes required for the extraction of the foetus having been made the subject of special investigation, can only be properly treated of in obstetrical works. It would be out of place, therefore, here to go into all the details required. Some of them, however, ought not to be entirely omitted. I proceed to give a brief account of their manual.

### § I.—*Sympphysiotomy.*

Some moderns, on the strength of a vulgar tradition mentioned by Riolan and Paré, and which has given rise to an opinion among the people that in different countries the pubes are ruptured in female infants at the time of their birth, in order that parturition afterwards may be rendered more easy, have supposed that symphysiotomy was practised at the remotest antiquity. It is true that De Lacourvée, who wrote in 1655, makes mention of a woman who died before being delivered, and in the dead body of whom he divided the symphysis pubis, with a view of enlarging the pelvis; also that Plenk proceeded in the same manner, in 1766, on another subject. But it is nevertheless certain, that no one had formally thought of proposing this operation on woman during life until Sigault, who was yet a pupil, made it the subject of a memoir which he read in 1768 to the Academy of Surgery. It is the only certain means which we can have recourse to, to save the infant: 1. When the head is closely wedged in the upper strait or below it; 2. When the head has passed through the abdominal strait and has become arrested by the narrowness of the perineal circle; 3. When, after the trunk is delivered, the head is found retained in the cavity. In such cases it is preferable to the Cesarean operation, even after the death of the woman, because it would be next to impossible to extract the foetus alive through the walls of the abdomen.

**A. Ordinary Process.**—The patient being placed upon an operating table or upon a bed, in the same way as for introducing the forceps, with her lower limbs slightly flexed and properly separated apart,

is to have her shoulders supported by an assistant ; two others take charge of her knees ; a fourth stretches the integuments of the abdomen ; and to the fifth is assigned the duty of handing to the operator the instruments he may require. The surgeon, seated or standing up, to the right or between the legs of the woman, makes with the convex bistoury an incision which should commence a little above the symphysis and be prolonged to the upper part of the clitoris. This incision, which comprises the skin, which has been previously shaved, and all the soft parts of the mons veneris, will be parallel to the axis of the body, and fall as accurately as possible upon the middle of the articulation. At its lower part, however, it is well to incline it a little to one side between the apex of the labium majus and labium minus, or even to separate from the pubic branch one of the roots of the clitoris, in order to avoid afterwards dangerous lacerations. There can be no other than small arteries to tie, unless the internal pudic has been divided by prolonging with too little caution the division of the parts below.

*To divide the cartilage,* the most certain mode is to incise it from above downwards and from the cutaneous to the pelvic side of the symphysis. It will always be found sufficient to restrain the bistoury to some lines from its point by means of the two first fingers of the left hand, while the cutting edge is made to operate with the right hand. This inconvenience also is prevented by introducing the catheter at the beginning or at least before commencing the second stage of the operation. By this means we empty the bladder, and the catheter afterwards serves to push the urethra to the right, while we slightly incline to the left the incision of the infra-pubic ligament. The ligamentous matter having been divided, greater precautions are required, and we no longer cut except by drawing upon, so to speak, the point of the instrument, and we cease to make use of it as soon as we encounter nothing more to divide of an elastic or resisting nature.

*B. Various Processes.*—We might also, as M. Imbert appears to have done in several instances on living women, as was done, it is said, in 1780, at Utréra, in Andalusia, as is suggested also by *Aitken (Journ. de Méd., t. LV.)* and advised by *M. Pétrequin, (Bull. de Therap., t. XI., p. 275.)* divide the cartilage from below upwards, and from behind forwards as it were by puncture, so as to leave the integuments intact in front. If it should happen that the symphysis was ossified, there would be so little chance of obtaining any considerable degree of enlargement, that in place of sawing through the articulation, as *Siébold* has done, I would prefer having recourse to the Cesarean section. In applying the saw on the body of the bone itself, outside of the symphysis, as is recommended by *Desgranges*, the operation would be neither more nor less dangerous, for it is in the sacro-iliac articulations that the difficulty is found and not in front.

*C. The separation of the cartilage* is scarcely effected when the posterior branch of the angular lever formed by the os ischii, acted upon by the elasticity of the posterior ligaments, produces a certain separation between the bones of the pubis, which must vary also according to the degree of narrowness of the pelvis, and that of the consistence or softening of the symphyses. Moreover, I can scarcely

believe that this, of itself, can go so far as to become dangerous, or that it can be necessary to limit it, as has been recommended, by compressing the hips before terminating the operation. On the contrary, we are almost always obliged to make pressure with gentleness and moderation from before backwards, and from within outwards, upon the spines of the ilium, or to separate cautiously the thighs of the woman, in order to enlarge the opening to the proper extent.

D. *The parturition having been accomplished*, the surgeon washes the woman, approximates the bones of the pubis together, and covers the wound with linen besmeared with cerate, and with lint and compresses, and supports the whole by means of a body-bandage drawn sufficiently tight to make partial resistance at least, to the re-separation of the bones. The patient should continue on her back, and in the most perfect state of rest. Her thighs especially, are to be kept in a state of absolute repose for the space of six weeks or two months, which is the time required for the consolidation of the symphyses. In other respects we proceed in the same way in the treatment as for grave operations, taking care to combat the symptoms with energy if any should supervene. As the termination of the cure approaches, no movements or walking are to be permitted except with the greatest degree of caution. If there should be ever so little mobility or pain remaining in the pelvis the patient should again be placed in repose for a certain length of time. It is not often found practicable for the patient to stand up or walk without danger until at the expiration of three or four months. Nothing, doubtless, would be more desirable than the consolidation of the divided symphysis; but women in whom this has not taken place have, nevertheless, been enabled to walk and to stand up, and even jump without being sensibly incommoded by it; a peculiarity which is explained by the great degree of solidity which has been acquired by the posterior symphyses. A. Leroy and M. Lescure go so far as to say that we ought to encourage this by withholding any bandage from about the pelvis; they allege, and perhaps without being entirely erroneous, that the interpubic void is then filled up by a cellulo-fibrous tissue, which impairs in no respect the resistance of the articulations, and by which means, therefore, the woman would be afterwards delivered with much more ease.

E. *Process of M. Galbiati.*—M. Galbiati, of Naples, substitutes for symphysiotomy another operation, which, properly speaking, is nothing else than a modification of what had already been proposed by Desgranges. In place of dividing the cartilage, he recommends that we should make the section of the body and branch of the pubes on both sides, between the infra-pubic foramina, as had already been recommended by Aitken. By this process the sacro-iliac symphyses remain intact; we run no risk of wounding the bladder or urethra; no traction scarcely is made on the cellular tissue of the pelvis; the consolidation is readily effected; no abscess, caries, fistula, claudication or peritonitis are to be apprehended, and we obtain a considerable degree of amplification in the sacro-pubic diameter. Some trials made upon the dead body, and certain experiments which have been undertaken by M. Ashmead, induce me to believe that we ought not to precipitately reject the suggestion of the Neapolitan professor,

though the essays which he has hitherto made can scarcely be considered encouraging. The operative process, in his method, moreover, would be rendered very simple, if, as M. Stoltz (communicated by the author, October 1st, 1837,) recommends, we should make use of Aitken's saw, conducted through a small incision of the soft parts, in order to saw the bones from behind forwards.

### § II.—*Cesarean Operation.*

The name of Cesarean section is applied to the incision which is made into the womb to extract the child from it. The expression by a latitude of meaning is also applied since the time of Simon, to those incisions which are sometimes found necessary upon the neck of the uterus, with the view of favoring the passage of the head of the foetus. The Cesarean section has frequently been performed with success, though it cannot nevertheless be denied that it is attended with danger. Boerhaave and Boer were doubtless wrong in maintaining that scarcely one cure is obtained out of 14 operations; it is at least certain that it has been performed a number of times at Paris during the last 40 years, and that, including in this number the operation of M. Dubois in April, 1839, all the women have perished; that out of 73 cases cited by Baudelocque, 42 were fatal; that out of 106 related by Sprengel, 45 were fatal; and that in 231 operations mentioned by Kelly and Hull, 123 of the patients died. We should add that all the successful cases certainly have been published, and that the authenticity of a number of those is a matter of great doubt; while, according to all appearance, it has not been the same with the unfortunate cases, the greater portion of which may well have been suppressed. We may therefore affirm that up to the present time the Cesarean operation has been fatal in at least one case out of two, and that Tenon must have been deceived in asserting that since the time of Bauhin, it has been performed at the Hotel Dieu on 70 women, who have survived. According to J. Burns and M. S. Cooper, there has not yet occurred a single well-attested example of success in all Great Britain, though it has been performed there from 15 to 20 times. One could not imagine however, *a priori*, that it would be so dangerous. It is true that the wound which we are obliged to make in the walls of the abdomen is very large, but the parts that we divide are not of a very delicate character. There are no large sized arteries or nerves, and nothing of any importance to be avoided. The peritoneum is wounded, but the digestive organs may be respected without difficulty. How often also have we not seen the most extensive and most complicated eventrations, and penetrating wounds of every description in this part, without giving rise to any other than the most trifling accidents and allowing of the restoration of the patient? Would then the wound of the uterus itself be so formidable a circumstance? Everything on the contrary shows that there is in this organ but a very slight degree of irritability, but little tendency to contract inflammation, and the most favorable conditions for the certain and prompt completion of cicatrization. It would appear therefore that hysterotomy is not so much a serious operation in itself, as in consequence of the peculiar state in which

the woman operated upon is situated. I can scarcely therefore reject from my mind the idea, that if we operated as soon as the indication was positively established, without waiting until the patient was exhausted in fruitless efforts ; that if the uterus had fallen into a state of torpor, or was at the point of becoming inflamed, if it was not already so ; that if peritonitis or metritis were imminent or already developed ; or if in fine the life of the patient appeared to be placed in serious jeopardy, the Cesarean operation would be far from being as frequently mortal as it unfortunately has been up to the present time.

### § III.—*Examination of the Methods.*

When the Cesarean operation was not had recourse to until after death, it was performed on the left side of the abdomen : *the woman, says Guy de Chauliac, was opened by means of a razor along the left side, because of the liver, and so much the more so from this part being more free than the right side* ; but since it has been performed on living woman, it has been subjected to more rational rules. Among the different processes recommended by accoucheurs, there are five which have more especially attracted attention ; in one the incision is made on the median line, parallel to the axis of the body ; in the second, outside of the rectus abdominis muscle ; in the third, the abdominal walls are divided transversely on one side ; in the fourth, the wound is made immediately above and in the direction of Poupart's ligament ; finally, the operation in the fifth variety is performed on a line with the crest of the ilium.

A. *On the linea alba.*—This process, preferred by Baudelocque, and now generally adopted in France, England, and Germany, enables us to avoid the muscles, to divide only upon the linea alba, and to inflict but very little pain ; no artery can be wounded, and we incise the uterus moreover in a direction parallel to its principal fibres.

B. The *ancient* accoucheurs, in operating upon the side, selected in general the left one, and made an incision sometimes straight, at other times slightly oblique, and occasionally in the form of a crescent, but always immediately outside of the rectus muscle. According to those physicians who have adopted this method, it has over the preceding the advantage of preventing the bladder from being in any manner wounded, of allowing of a ready cicatrization, and of presenting less obstruction to the discharge of matters which must escape from the wound. As the uterus has almost always undergone a twisting movement upon its axis by becoming inclined to the right or to the left, it has been supposed that by incising upon the median line we should come down nearer to its left border than to the middle of its anterior region. It was also from this consideration that the recommendation has been given to operate upon the side toward which the uterus has naturally become deviated. In admitting these advantages to be well founded, they would nevertheless, as it appears to me, be more than counterbalanced by the danger of wounding the epigastric artery or its branches, of having a solution of continuity, the lips of which, in consequence of the retraction of the oblique and transverse muscles, it would be almost impossible to keep

in a state of approximation, and by the impossibility of obviating the defect of parallelism in the wounds of the uterus and abdomen.

C. *Lauverjat*, who at first considered that there would be great advantages for hysterotomy upon the linea alba, endeavored, in order to avoid the inconveniences connected with the two methods above, to systematize a process which had already been in use among some practitioners, and recommended that we should make a *transverse incision*, five inches long, upon the side, between the rectus muscle and the spinal column. By proceeding in this manner, he says, we separate rather than divide the fibres of the transverse muscles; we avoid the epigastric and lumbar arteries; and come down upon the fundus of the uterus, the cavity of which forms a funnel which readily admits of the escape of the lochia through the vagina and wound. The parallelism is very easily preserved, the suture becomes unnecessary, and the simple position is all that is required for keeping the lips of the division approximated. Finally, from the external angle of the wound occupying a depending position, effusions into the abdomen are infinitely less to be apprehended than in the other methods; but it may be objected to this method, that the fleshy fibres of the external and internal oblique muscles have necessarily to be divided, that the slightest effort must protrude the viscera externally, that the uterus from being divided transversely upon its fundus, the part where its vessels are of the largest dimensions, must soon become separated to a considerable distance from the external opening, and that its fibres in contracting must rather interfere with than favor the approximation of the borders of the internal division: so that notwithstanding the two successful results obtained by *Lauverjat*, and the preference which appears to be given to this method by *Sabatier* and *Gardien*, it is scarcely attended with less danger than the two others.

D. *At the iliac fossa*.—I. M. *Ritgen* especially dreading any wound to the peritoneum and body of the uterus, has recommended that we should incise transversely the attachment of the large muscles of the abdomen above the crest of the ilium, detach the peritoneum down to the upper strait, and divide the neck of the uterus to a sufficient extent to allow of the extraction of the foetus. In the first place I cannot see how it could be possible to open into the apex of the womb without dividing the serous membrane which covers it; then again the difficulties inherent in this process, together with the dissection which has to be made in the iliac fossa, do not appear to me calculated to render the operation less dangerous than those which have been mentioned. As far moreover as I am informed, this method exists as yet only in idea, and nobody, up to the present time, has ever performed it upon living woman.

II. M. A. *Baudelocque*, considering that the principal dangers of the Cesarean operation are to be imputed to the double lesion which is made in the peritoneum, and regarding wounds of the uterus as almost necessarily fatal, has proposed a method which, under this combined aspect of the subject, appears to him to be infinitely preferable to all the others, and which in reality differs but little from the preceding. His incision, which begins near the spine of the pubis, is prolonged in a direction parallel to Poupart's ligament as far as

beyond the antero-superior spinous process of the ilium. He selects the left side because of the inclination of the neck when the uterus has deviated to the right, and the right side in the contrary case. After having divided the abdominal wall without touching the epigastric artery, he pushes back the peritoneum from the iliac fossa as far down as into the pelvic cavity, and detaches from it, the upper portion of the vagina, which he opens into. Through this opening, which ought to have a certain extent, the finger is to be introduced into the uterine orifice, which we endeavor to draw towards the wound in the belly, at the same time that we make pressure on the fundus of the uterus in an opposite direction to favor its inversion. When we have succeeded in placing the neck in relation with the opening through the abdominal walls, we leave the labor to the contractions of the uterus, or should it become absolutely necessary the uterine orifice is to be dilated with the fingers, when the *fœtus* can be extracted either with the hand or with the forceps.

III. *Mdme. Boivin* and *Chas. Bell*, having a special dread of hemorrhage after the Cesarean operation, also felt the necessity of incising the uterus as near as possible to its apex, which is the part where there are scarcely any vessels to be found. It would be difficult for me, however, to believe that an operation of this kind could be practicable in the majority of cases, or that the laceration of the vagina, with the destruction necessarily made in the iliac fossa or cavity, would be less dangerous than the simple methodical incision of the peritoneum or uterus, in the manner it may be performed in the usual operation of hysterotomy. I may add also that M. Baudelocque, after having made trial of his operation of elytrotomy in a woman whom he met with a long time since, and in which case he was assisted by M. Hervez de Chégoïn, nevertheless deemed it advisable to recur to the Cesarean operation, properly so called. A single fact, I am aware, does not authorize us to form rigorous conclusions; but this one, and which is the only one in relation to living woman, appears to me to impart a great degree of force to the objections which had been *a priori* entertained against the ideas of the author.

IV. Another mode of operating, which is somewhat similar to that of M. Ritgen, and which also does not appear to differ much from that of M. Baudelocque, appears to have been proposed almost at the same time by *Physick*. From having remarked that in pregnant women the peritoneum is easily separated from the bladder and neighborhood of the neck of the uterus, this surgeon supposed that by making a horizontal incision immediately above the pubis, we might reach the apex of the womb, and open into it, without wounding the serous abdominal membrane; but whatever M. W. E. Horner may say on this subject, this operation is but little worthy of its inventor, and is not of sufficient importance to be dwelt upon.

#### § IV.—*Operative Process.*

We should never neglect to empty the rectum and bladder before commencing the Cesarean operation, especially when we propose to follow the process of Mauriceau. The articles required, consist of

a convex and probe-pointed bistoury, forceps, scissors, suture needles, ligatures, tubes of quills, adhesive plasters, and lint in the form of small balls, and gateaux. There will also be required portions of linen spread with cerate, long and square compresses, a body bandage, large fine sponges, a syringe, canulas of gum-elastic, in case of the necessity of injections, tepid and cold water, vinegar, wine, and eau de cologne. The patient is to be placed as far as practicable upon the bed, where she is to be continued during the first days after the operation. Her position ought not to be disturbed. Being placed on her back with her head moderately elevated, and her legs and thighs slightly flexed, the assistants are charged to pay attention to any sudden movements that she may be induced to make from the pains. Two intelligent assistants are to apply their hands upon the sides and fundus of the uterus, so as to circumscribe it completely, in order that no organ may slip between its surface and the abdominal walls, and that it may, so to speak, constitute one united mass with these last mentioned parts. To effect this purpose, the naked hands appear to me to be not quite so commodious, as when they are applied over large portions of sponge, as recommended by MM. Hedenus and Kluge. The surgeon, with a convex bistoury, incises the integuments from the neighborhood of the umbilicus to the pubis, to the extent of from five to six inches. The sub-cutaneous tissue, aponeurosis, and muscular fibres, as well as the cellular tissue, are, should we not operate upon the median line, divided in succession in the same manner and to the same extent. The incision ought not to descend too near to the symphysis, because of the proximity of the bladder, and that the walls of the abdomen in this part usually possess a great degree of thickness. It would be better to prolong it above the umbilicus, while taking care to pass to the left of this cicatrix, in order to avoid the umbilical vein, and especially the anastomoses which may exist between it and the epigastric vein. After having opened through the peritoneum in such manner as to allow of the introduction of the left forefinger, which is to serve as a director to the instrument, we enlarge the wound with the probe-pointed bistoury, so as to give it the same extent as the division of the skin. If, as I saw in the case operated upon by M. Dubois in 1839, the intestines should, notwithstanding all our efforts, escape externally, it is to be well understood that they are to be reduced before we go any farther. The uterus is now exposed to view. We incise it layer by layer, and with caution, until we come down to the surface of the foetal membranes; in order to preserve as much length as possible to its neck, we direct the assistants gently to depress its fundus by making a vibratory movement upon it forwards. We might, in fact, after the manner of M. Kluge, seize hold of the lower and deep angle of the wound in order to effect, or at least to favor a movement of this kind, which by enabling us to prolong the section with ease very high up, would allow us to respect the apex of the uterus. Nor can I see moreover any inconvenience in separating beforehand with the finger, the placenta and the membranes to a certain extent. It is at this period, and not before commencing the operation, that it might perhaps be allowable to follow the recommendation of Planchon, and to rupture the membranous bag in the upper part of the

vagina, either by means of the fingers or Siebold's instrument. Upon the supposition that we perforate the membranes of the foetus through the wound, which appears to me to be the preferable course, it is important that the assistants redouble their attention, in order that the abdominal walls may not be separated from the uterus. We should by this means oppose an obstacle to the effusion of the waters into the peritoneal cavity, while the tendency which the viscera have to escape outwards would be effectually resisted. The extraction of the infant is to be made without delay; when it presents itself by the head or breech, we draw it out in this position, and in order to aid its escape, direct the assistants to make gentle pressure through the walls of the belly upon the sides of the uterus. Should it present itself in another position, we seize it by the feet, and extract it with the same precautions as in parturition through the natural passages, while taking care especially not to displace or make traction upon the lips of the division. Immediately after the extraction of the foetus, the placenta is soon forced by the contraction of the uterus to protrude itself into the wound. We grasp it by one of its borders, when that can be done, rather than make traction only upon the cord. As to the membranes, we take care to roll them up in cords as in natural labor, in order to prevent any of them being left in the uterus. If blood has been effused or formed into clots, it is to be removed with the hand. It would be well, moreover, to cleanse all the parts with an injection of tepid water; but I do not think that there would be any utility, with a view of keeping the neck open, to place a thin meche in it as recommended by Baudelocque, nor any species of canula whatever. These means would not prevent the orifice from closing, and without conferring any advantage would augment its irritation. The finger, which is to be occasionally introduced, will be sufficient to open it again, should it cease to give egress to the matters, which nothing in fact can prevent, from passing wholly or in part through the wound.

### § III.

*The operation being terminated*, we have to look to the suspension of the flow of blood. In the lateral process, and especially in that of Lauverjat, several small arterial branches may have been divided, which are to be constricted by the ligature or by torsion, unless we should prefer to do this in proportion as they have been opened. During the operation the principal orifices of the uterine arteries should have been closed by the fingers of the assistants, nor has it ever been deemed proper to apply a ligature to them. After the lapse of a few minutes the incision in the uterus is reduced to the extent of one or two inches, and from that time every kind of hemorrhage becomes impossible. The wound of the abdomen is usually reunited by means of the interrupted or twisted suture, which is the only means of preventing a protrusion of the viscera. The lower angle of the division should be left free to enable the discharges to escape and to allow the meche, one extremity of which is to be in the uterus, to conduct them to the outside. The points of suture, moreover, do not prevent our applying adhesive plasters between

them, nor from assisting their action by means of a uniting bandage and a favorable position. The wound is afterwards to be covered with a perforated linen. Two long and large compresses are placed upon the sides. Plumasseaux and ordinary compresses, with the body bandage, all properly applied, will complete the dressing. An antispasmodic potion, rendered slightly opiate to calm the nervous agitation, proper precautions to enable the lochia to escape through the vagina, and not to become effused into the belly, with diluent drinks, and should the slightest symptom of inflammation supervene bleeding and leeches, together with the most perfect repose of body and mind, constitute all the advice that the surgeon can give to the patient to prevent the dangers with which she is threatened.

#### ARTICLE XVI.—VAGINAL UTEROTOMY.

There may be a great number of reasons, according to authors, which would render it necessary to have recourse to the vaginal Cesarean operation. An obliteration with a fibro-cartilaginous induction of the neck, as in the case related by Simson, and even in the one mentioned by Van Swieten; violent convulsions, which put the life of the woman in danger while the orifice is too tense or still too little dilated to allow of the introduction of the hand, as is seen in the cases of Dubosque and Lambron; as also an extreme obliquity of the orifice backwards, at the same time that the head of the foetus drags into the cavity and to the vulva the anterior wall of the uterus, which it distends, attenuates and ultimately lacerates, if we do not hasten to make the incision, as Lauverjat did,—constitute the accidents which have in most cases required this operation. It may also become advantageous when the uterus, after having escaped from the pelvis during pregnancy, has not been reduced, and when its neck cannot be dilated by means of the fingers, even though there be danger in retarding the labor, examples of which are related by Thénancé, Jacomet and a surgeon of Vaux, cited by Bodin. But it has been more especially proposed in cases of scirrhosities, and when the orifice presents so great a degree of resistance that the woman is exhausted in fruitless efforts to effect its dilatation. Finally, it would be also applicable, as Bodin has endeavored to demonstrate, in cases of presentation of the arm, should it ever be in such cases actually impossible to make an attempt to seize the feet, and should there not be other means of avoiding the amputation of the limb. The speculum, which is employed by some persons, is not necessary for this operation. By means of the probe-pointed bistoury protected by a bandage and guided by the finger, we readily reach into the neck, if it is not too distant from the pelvic axis. In the contrary case, we should have to replace the straight bistoury by the curved bistoury of Pott. In a case of necessity, we might confine ourselves to a single incision; but as it is important that this should not be too deep, we should give the preference to several incisions made at a certain distance from each other. At first sight it would appear that the passage of the head could not be effected without enlarging such wounds so much as to prolong them to the body of the uterus and to lacerate the peritoneum. Nothing of this kind, however, happens,

and they are usually restricted to the tissues of the neck. When we operate for a scirrhoue or fibrous induration, it rarely happens that it gives rise to a discharge of more than a few ounces of blood. In such cases Dugès recommends and with reason, as I conceive, that we should at the same time remove all the diseased parts, in place of merely incising them. When we divide the anterior wall of the uterus without going as far as the orifice, we are obliged in beginning the operation, which is always more delicate than in the preceding case, to make use of a straight or convex bistoury which is not probe-pointed. In making the incision we cannot observe too much caution to prevent our wounding the part of the fœtus which should first present itself. When, however, we have penetrated into the uterus, the finger becomes a sure guide, and the wound may be enlarged by the instrument, without any danger, to as great an extent as may be necessary. We will remark, however, that there would not be as much danger in prolonging it posteriorly as in front, because of the proximity of the bladder, and that it would be, moreover, useless to give it any great degree of extent. After the delivery this wound contracts very rapidly, and frequently the neck has already resumed its natural position before the lapse of half a day. Should the blood flow in too great quantity, injections with the oxy-crat, together with tamponing, would in general arrest it without any difficulty, and cauterization, which could also be applied with facility, could but rarely become indispensable in such cases. As to the lochia, they will make their escape either by the neck or by the wound, and the woman, in this respect, does not require any other attentions than those which are had recourse to after ordinary parturition. As to what relates to cephalotomy, the employment of crotchetts, cords, forceps, turning of the child, &c., I do not think it necessary to repeat them here, as I have entered in detail upon these subjects in the second volume of my *Treatise on Tocology*, and so much the less as such operations belong exclusively to the province of the accoucheur. If I have allowed myself to say a word on the subject of symphysiotomy and the Cesarean section, it is because the surgeon is sometimes sent for to perform these operations, even by those persons who exclusively occupy themselves with obstetrical practice. I refer also to what I have said, farther back, on the subject of the occlusion of the neck of the uterus and of the vulva.

[*Cesarean Operation.*—The Cesarean operation on the linea alba, by Dr. Wolff, in the case of a woman aged 24, (*Neue Zeitschrift für Geburtshunde*, Von Busch, d'Outrepont, Ritzen and Siebold, 1840, t. XIX.,—also, *Arch. Gén. de Paris*, 3d ser., t. X., 1841, pp. 499, 500,) in whom the head of the child, although perforated by the forceps, could not, in consequence of the narrowness of the pelvis, be extracted, was perhaps not altogether justifiable, though the mother did recover. Because in the methodical course of proceeding, attempts should, as the editors of the Archives say, have been first made to turn the child, as the upper strait had full two inches and a half in diameter, and had not that succeeded, the fœtus itself could have been detached in piecemeal, which was certainly preferable to a step so hazardous as that of gastro-hysterotomy.

*Rupture of the Uterus during Parturition.*—M. Velpeau, re-

marking on a case of this kind, transmitted to the Paris Academy of Medicine, (sitting of Sept. 12, 1843, in *Arch. Gén. de Méd.*, tome III., 4th ser., p. 223, 224,) by M. Castelli, and in which this latter extracted the child by the operation of gastrotomy, considers it improper to recur to this extreme surgical means, until all attempts to return the child into the uterus, whether it has escaped either partially or wholly from it into the abdominal cavity, have failed. In M. Castelli's case, an exostosis in the pelvis is stated as the cause. M. Velpeau considers that certain tumors in this region might be readily mistaken for exostoses.

A remarkable case, in which the Cesarean operation was unnecessarily performed by a country physician in Germany, is furnished by Professor Behm, of Stettin, (*Neue Zeitschrift für Geburtskunde*, 1843, t. IX., No. 2,—*Arch. Gén. de Méd. de Paris*, 4th ser., t. II., pp. 103, 104, 105.) The Cesarean operation had been performed under the erroneous impression that there was malformation and abnormal contraction of the uterus, which on the woman who had recovered from the operation becoming again pregnant four years afterwards, was found by Prof. Behm on examination not to exist. There was, however, a remarkable diminution in the depth and size of the vagina, this cavity having an extent only of an inch and a half when it terminated in a dense fibrous contraction or stricture, presenting so small an aperture that it scarcely admitted of the insertion of a crow's quill. This may have led to the mistake of the previous accoucheur. M. Behm, by means of dilatation with pieces of sponge, succeeded in increasing this opening to a small extent, but when labor came on at the full term, a few weeks afterwards, it was still found to present such serious impediment to the progress of the membranes and head, that he was obliged to enlarge it by the bistoury, after which the delivery was readily effected by the forceps. The mother and child were both preserved. It is a remarkable circumstance, say the editors of the *Archives Gén.*, (*ib. loc. cit.*) that the cicatrix of the original uterine wound should have not ruptured during the violent contractions of the womb for a whole day, the more so as it would seem that perfect cicatrization of the uterus does not always take place, (see *Bulletins de la Soc. Anatomique*, Mars, 1841,) after the Cesarean operation.

The Cesarean operation was in one case first performed by the surgeon, and in the next pregnancy by nature herself! This is certainly one of the most remarkable cases on record and can scarcely be credited. The surgeon who gives its details, Dr. Prael, of the Obstetrical Institute of Hildesheim, (see Neumeister's *Allgem. Repertorium der Gesam. Deutsch Med. Chir. Journalistik*, June, 1844; also *Arch. Gén. de Méd. de Paris*, 4e sér., t. VI., Sept., 1844, p. 114, &c.,) states that in the first pregnancy of the woman in question, who was twenty-eight years of age and with so contracted a pelvis as to render parturition impossible in the natural mode, he performed the Cesarean operation Jan. 11, 1842, on the linea alba without the slightest difficulty, delivering the child alive and perfectly well, and closing up the wound in the uterus by six points of suture. The child shortly afterwards died of trismus, but the mother speedily recovered and was restored to perfect health. This woman, not-

withstanding the dangers in view, becoming again pregnant in January, 1843, and the child being dead, labor shortly after came on, (July 18,) when a rupture of the uterus and abdominal walls suddenly took place, causing thus the speedy delivery of the child by the efforts of nature alone. The surgeon being sent for, detached the placenta and membranes, and returned the epiploon, and then brought the wounds in the abdominal wall and uterus together by adhesive plaster. Their direction was *transverse* to the original incision. The most remarkable point is that this woman, after a series of dangerous accidents, fever, suppuration, &c., perfectly recovered! No doubt the previous operation paved the way for the rupture.

The *Cesarean operation* was, it is stated, successfully performed July 4, 1844, by Dr. Bresciani of Borsa in Italy, (*Annali Univ. di Med.*, Dec., 1844,) on a young married woman aged twenty, in whom the pelvis and spine were too much deformed to admit of natural labor. In addition to this, the anterior obliquity of the womb was such as to preclude the possibility of adopting any of the ordinary processes, as those of Mauriceau, Baudelocque and Lauverjat. The surgeon, after ascertaining the position of the epigastric artery on the external border of the rectus abdominis muscle, and directing the assistant to make compression upon it, proceeded to make his incision through the integuments, peritoneum and uterus. The woman is said to have recovered entirely.

*Successful removal of the uterus by ligature.*—The uterus has, in a recent instance, been successfully removed entire by ligature by Mr. Parsons at Bridgewater, (Eng.,) April 21, 1844, (*Provincial Medical and Surgical Journal*, July 10, 1844,) in a maiden lady aged sixty years, who had been troubled with prolapsus for sixteen years; the *first three years* of which it appears she had persisted in retaining in the vagina a large globular India-rubber pessary, which she had neglected to remove occasionally as had been directed, and which produced a discharge so offensive and profuse and had become so wedged in that Dr. J. Toogood, the former partner of Mr. Parsons, and to whom the case originally belonged, was actually obliged to deliver her of the foreign body by the forceps! The prolapsus then returned, and suffering from it for years, the whole body of the uterus finally extruded itself from the vulva in the shape of a pyriform, ecchymosed tumor, seven to eight inches long. The *taxis prolapsi*, cold applications, &c., proving fruitless, a ligature was applied around the neck or narrow part of the tumor just within the vagina, by which the whole organ was speedily and effectually removed. The mass weighed nearly two pounds, having the shape of the uterus but much altered in character, the cavity being quite obliterated, and the os uteri become almost cartilaginous. No bad symptoms ensued, and the recovery was perfect. On examination no uterus could be discovered, the vagina appearing to terminate in a *cul de sac*. Dr. Toogood says he advised the operation with greater confidence from having known of two other cases in which the whole body of the uterus was removed by ligature without any immediate danger; but he is ignorant of their final result.

The greater portion of, if not the entire uterus in a case of prolap-

sus of this organ, is stated by Dr. Esselman of Nashville, Tennessee, to have been extirpated by him by ligature, under the impression that it was a polypus. Further details are desirable in this case than those published in the *American Journal of Medical Sciences*, (1844.) The same remark perhaps is applicable to the prolapsed, degenerate and transformed uterus stated above to have been excised (*Provincial Med. and Surg. Journal*, 1844) by Dr. Toogood.

*Spontaneous descent and expulsion of a cancerous uterus.*—A case was transmitted by M. Estevenet, of Toulouse, to M. Velpeau, (*Arch. Gén. de Méd.*.. Sept., 1844, p. 119,) in which a woman, aged 37, affected with a cancer of the womb, was, while at stool, seized with a prolapse of the organ, by which the whole uterus was spontaneously expelled entire through the vagina! The fact was established some days subsequently, by an examination of the parts, after her death, which was caused by peritonitis.

*Cancer of the Uterus.*—Dangerous mistakes may occur from the too frequent neglect of examinations *per rectum* as well as *per vaginam*, in all diseases in which the pelvic organs are implicated. Dr. E. Hocken has given a recent striking illustration of this (*Ed. Med. and Surg. Journ.*, vol. CLXVI., Jan. 1, 1846, p. 24, &c.) in the case of a woman who was supposed to have a cancerous affection of the womb or rectum; but in whom it was found, upon examination, that almost the entire colon, and all the rectum, had become enormously distended with hard, impacted fœces, causing apparently acute pain over the whole abdomen. This state of things had endured for a month, during which a partial excretory drain appears to have been established by the frequent vomitings of the ingesta, and a muco-purulent discharge from the vagina. Nothing whatever passed per anum. The constipation, it would seem, was first caused by the pain in going to stool, after she had injured the vagina by a fall, causing hemorrhage from that part. The woman at the last report was nearly quite restored by the mechanical removal of the indurated fœces by means of a lithotomy scoop.

*Forcible tearing out of the uterus by mistaking it for a second fœtus.*—Prof. Rossi furnishes a perfectly authenticated fact, (*Annali Universali di Medicina*, vol. 101, January, 1842,) in which a woman aged 28 had the uterus, in the year 1837, forcibly torn out by a mid-wife, on the supposition that she was extracting a second child after the delivery of the first. The most remarkable point is that the parts left, cicatrized, and that the woman was yet alive four years afterwards. This fact, however, would not, as Prof. Rossi seems to think, justify a resort to excision of the uterus for cancer.

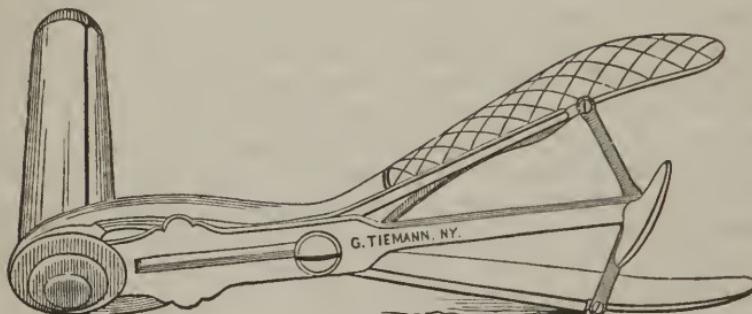
M. Riberi has completely excised the urethra, except a small portion adjoining the neck of the bladder, in removing a cancerous tumor of this passage from a woman aged 60. (Translation of a brochure of M. Riberi on this subject, by Dr. F. Cazalis, Montpellier, 1845, in octavo, 20 pp.) M. Riberi knows of no similar operation. The patient recovered entirely and without incontinence. In the event of the operation being required again, he advises the sound to be introduced into the bladder as a point d'appui for the instrument before making the excision.

*Improved Speculum Vaginæ.*—One of the best modifications of

this valuable instrument is that of a skillful manufacturer of surgical instruments at New York, Mr. George Tiemann. His improved speculum vaginæ is a modification of the speculum vaginæ of Weiss, in London. It is composed of three blades, which, when closed, form a cylinder sufficiently small to be used likewise for any operation in *ano*. Instead of the enlargement by the revolution of the screw, like Weiss's, the three blades open by compressing the handles gradually with the hand, and securing them by turning the thumb-screw. The advantage of this instrument is this: the operator can judge better how far he may open the three blades without injury, whereas in turning the screw handle, he does not feel to what extent he forces the instrument.

This speculum, considered as one of the most useful, can be manufactured for almost half the price of that of Weiss's, which places it therefore within every practitioner's reach.

The instrument on the plate annexed, is a German silver cylinder, to serve as a reflector when the speculum is opened and the wooden plug withdrawn.



SPECULUM VAGINÆ ET ANI.



CYLINDER AND PLUG.

## PART SEVENTH.

## URINARY APPARATUS.

## CHAPTER I.

## CALCULI OF THE BLADDER.

## ARTICLE I.—DIAGNOSIS OF VESICAL CALCULI.

BEFORE proceeding to the treatment of vesical calculi, we should have first established their existence.

§ I.—*Natural Signs.*

Most persons affected with stone experience a dull pain, or sort of weight in the fundament, and which is increased by the movement or concussions which the patient undergoes while riding in a carriage or on horseback, or when he is obliged to submit to the least jolting. The urine deposits a whitish sediment, mucosities that are flocculent, sometimes thready or tenacious, or that are frequently sandy, muddy, or as it were purulent, fetid and sanguineous. At the time of their emission it sometimes happens that they are suddenly suspended, and that a simple change of position of the body will again enable them to flow out with freedom, as if they had been momentarily interrupted by a valve placed over the entrance into the urethra. The pains sensibly increase in proportion as the bladder is being emptied, and especially immediately afterwards. The extremity of the penis becomes the seat of a pruritis, which incessantly induces the patient to make traction upon it, from whence it happens that an extreme degree of length of the prepuce or penis, in infants particularly, constitutes of itself a symptom of vesical calculi. The patients have a frequent desire to urinate, and some of them discharge from time to time gravel or fragments of stone of considerable size. But these signs are far from being found combined in the majority of calculous patients; in many of them scarcely any are present; on the other hand various affections of the urinary passages, and which are disconnected with calculi, have in numerous instances simulated this ensemble of symptoms. A catarrhus vesicæ for example, may be accompanied with all those changes which have reference to the urine. If at the same time there should have been an irritation and alteration at the infundibulum of the urethra, the pain, together with a frequent desire to urinate, and the tractions made upon the penis might exist in the same manner as if there was a stone. The weight felt upon the fundament is produced also by a tumefaction of the prostate gland. As to gravel and sandy deposits, many persons have them without calculi being actually present. The sign which would appear to be the most conclusive, that is to say, the sudden suspension of the passage of the urine, though the bladder may not be empty,

may be also met with under other circumstances. The prostate may give rise to the production of a fold behind the urethra, which may lead to deception on this point. The same might take place from fungous tumors or a cerebroid mass formed upon the base fond of the bladder. The same circumstance might still more readily occur, if the lower wall of the urethra should give rise to the production of any *polypous* or pediculated growth whatever, and which should have become prolonged into the neck of the bladder. A patient who died at the Hospital of St. Antoine, while I was in that institution, in 1829, presented to me an arrangement of this description. On many occasions the passage of the urine had been suddenly interrupted before the bladder was emptied. This man died, and we found on the vesical *luette* that a tumor had been developed, which was similar to the fibrous tissues of the uterus in its density and structure. This tumor having a slender pedicle which was very much flattened in the direction towards the urethra, was of the size of a small pullet's egg. However little it was pushed forward, it closed up the excretory canal of the urine in the manner of a plug. Since then I have frequently encountered analogous tumors attached to the prostate. The proof, moreover, that none of these signs are conclusive is this, that experienced surgeons have in many cases operated for lithotomy upon patients who had no stone. Such signs, therefore, in themselves are not sufficient to justify the operation.

### § II.—*Catheterism.—Physical Signs.*

Those catheters and sounds that are not metallic, are not suitable for the catheterism of calculous patients. We make use of such as are of silver, copper, gold, or platina. Nevertheless, these three last mentioned metals, which have the advantage of being more sonorous, are rarely employed, while the silver sound is the one that is generally preferred. Some persons also have considered that a solid sound ought to be substituted for those that are hollow, since, from its being more heavy and compact, it would enable us to feel the calculus better; but these are particularities of little importance, which the skillful surgeon may dispense with. When the catheter is in the bladder it is necessary to withdraw its stilette, as the latter from some unexpected movements might lead to error. The thumb, which is kept applied upon its shoulder, while the fore and middle finger embrace it behind its rings, should entirely cover over the opening. If we should allow the finger which shuts it to move, a valvular motion might be thereby produced, and also a sound which would lead to a deception. By stopping it up with a peg, as recommended by Boyer, we should have no danger from this inconvenience. We should take care to introduce it while the bladder is filled with urine, by which means we are enabled to explore with greater certainty all the various regions of the organ.

A. *Should the patient be lying upon his back,* we begin by moving around the point of the sound backwards, and upon the median line, and to the right and left, inclining it with more or less force to one or the other side. We then, by strongly depressing its shoulder, direct it as high as possible towards the summit of the bladder; after

which, it is advisable to bring back its beak again to the neck of the bladder and its neighborhood, as well as upon the different points of the bas fond. If, after having proceeded in this manner, the sound does not encounter any calculi, we cause the patient to be seated on the edge of his bed, or we may even make him get up and walk a few steps, as it likewise may be advisable, in some cases, to make him lie down successively in various positions.

B. In the last place, the surgeon allows the escape of the urine, and without disturbing the instrument, waits till the bladder contracts upon itself, in such manner as to push the calculus towards the urethra and to place it in contact with the metal. In the majority of cases these different researches soon enable us to ascertain with certainty the existence of a stone ; but from the mere fact that we do not find it, we are not therefore authorized in declaring that there is in reality no stone. Small stones sometimes elude the most skilful manœuvres. Frequently there are *pouches (vacuoles)* in the bladder, of considerable depth, so that the sound in passing over these imparts no sensation of any solid body. It is not rare, for example, to find immediately behind the prostate, a cavity either to the right or left or throughout the whole extent of the bas fond of the organ, where stones of a certain size will readily escape the explorations of the operator, as I have myself seen, and as is proved also by the facts related by M. Camus, (*Rev. Méd.*, 1831, t. II., p. 283,) and M. Belmas. It is even proved by the cases since collected by M. Bouchacourt, (*Arch. Gén. de Méd.*, April, 1839,) that in certain patients, most usually those at an advanced age, this secondary cavity, occupying the bas fond, and bounded above by the prostate, and behind by the orifice of the ureters and that portion of the vesical parietes lying between them, may *encaise* and retain the calculus, and that it is usually accompanied with quite an extensive ulceration of the walls of the bladder. This alteration constitutes, according to M. Bouchacourt, a very serious form of calculous disease, for none of the patients, in fact, in whom it has been possible to identify it with certainty during life, have survived the operation. Nor, moreover, is lithotrity better adapted to these cases than lithotomy, this last in fact being preferable to the first. M. Bouchacourt, in such cases, inclines to a preference for the recto-vesical incision. Under other circumstances the calculus is, as it were, pinched up between two folds of the bladder, as it may be also retained in a special cul de sac, whether it be that the mucous membrane has only simply formed a hernial pouch through a laceration in the muscular fibres, as so often happens in what are called *columnar sacs*, (*vessies à colonnes*,) or that an actual *cyst* has formed around the stone, as F. de Hilden, (*Bonet, Corps de Méd.*, p. 444,) and Meckel, allege to have seen, and a specimen of which M. Gensoul has informed me he has in his possession. In a man who died of ischuria in 1833, at the Hospital of La Pitié, the natural bladder communicated by an orifice of six lines in extent with a second pouch, of the capacity of a demilitre, and which contained a calculus. I have since seen two other cases, which were in almost every respect similar. There were seven calculi in one of three pouches of a bladder which M. Sanson has shown to me.

C. It may be readily conceived that if the foreign body does not present itself entirely naked on some one point of its surface, catheterism would not recognize its existence, and that in other cases it would be by varying the position of the patient, the distension of the bladder, and the movements of the sound, that we might hope to meet with it. When the difficulty arises from the small size of the stone, or from the frictions being too feeble to be accurately perceived, Laennec supposed that auscultation might be of some assistance. We then apply either the ear or stethoscope upon different points of the hypogastrium, with the usual precautions, while on the other hand, we are manipulating the instrument in the interior of the bladder. By acting in this manner no sound will escape, and the slightest concussion of the instrument upon the stone will be perceived by the ear. In order to render this resource still more perfect, M. Ashmead, from the fact that air is a better conductor of sound than liquids, has proposed to fill the bladder with this fluid. By screwing *the plate of a stethoscope upon the shoulder of an ordinary sound*, M. Moreau de St. Ludgère, (*Thèse*, No. 247, Paris, 1837,) finds, and I have ascertained with him, that we hear the bruits of the calculus better than by any other method. But it is important that we should not allow ourselves to be deceived upon the value of processes of this kind. Whenever the sound freely comes in contact with the calculus, we feel it as well by the hand as by means of auscultation. I advise no one to assert from the testimony furnished by this last mentioned process, that a stone exists in the bladder, provided we have not also obtained evidence of this by simple catheterism. In conclusion, it is not the *feeling or hearing* of the calculus which is the difficult point, but that of touching and striking upon it naked.

D. Though in a number of cases the catheter may not encounter a stone where one or more exist, there are other cases which may lead us to the commission of an opposite error. *Exostoses* behind the pubis, such as have been seen by Houstet, Garengeot, M. J. Cloquet, and M. Belmas, and especially by Brodie, who met with one of the weight of 20 ounces; also other osseous tumors, situated upon the ischium, as related by M. Damourette, on the sacrum or coxal bones, as in the case figured by M. Haber, also an osseous cyst in the tissues of the walls of the bladder, an instance of which is found in the work of Boyer, may all lead to deception on this subject. The same may arise from the sacro-vertebral projection. The most frequent sources of deception, nevertheless, are to be found in the con-texture of the bladder itself. I have frequently noticed that by making the point of the sound glide from the median line towards the sides, a jerking motion is produced, from whence results a sensation of resistance and of inequalities which are well calculated to deceive those who are not aware of this peculiarity. This arises from the interior of the bladder being frequently rugous and bosselated, and from the fibres of its muscular membrane being united together into fasciculi that are more or less distinct. This may arise also from the presence of fibrinous or scirrhouss (F. de Hilden, dans Bonet, p. 445,) masses, or those of any other description developed on its internal surface, whether they are free or adherent. However little doubt

may exist on the subject, the operator should not neglect to introduce one or two fingers of the left hand into the rectum, in order to raise up the base fond of the bladder, and to favor the other manipulations with the catheter. It is also known that the fingers placed in this manner, when assisted by the application of the other hand upon the hypogastrium, have in more than one instance succeeded in identifying the presence of calculi without being aided by the sound.

E. These details might seem superfluous, had it not been demonstrated by numerous observations, that enormous stones may exist in the bladder, without the patient being conscious of them, and that lithotomy has, notwithstanding the most skillful explorations, been performed in other patients in whom no calculi existed. Every body knows the history of the monk who bequeathed his body to the surgeons, from the certain conviction in his mind that he had a calculus in his bladder, which nobody had been enabled to identify. The sound was introduced, and nothing was found. The patient died, when the stone and bladder were ascertained to have passed into the scrotum, (D. Sala in Bonet, t. IV., p. 432.) Bartholin (Bonet, *Corps de Méd.*, t. IV., p. 431,) has seen something similar. Lapeyronie, d'Alambert, the watchmaker Portalier, mentioned by Deschamps, also Sabatier and M. Richerand, each of them had an enormous calculus in the bladder, though none of them had scarcely any symptoms of it. M. Texier cites another case of this kind, related by M. Marjolin, in which it became necessary to saw through the bones of the pubis, in order to extract the calculus. On the other hand, we find in the Journal of Desault, that Le Blanc acknowledges to have performed lithotomy on a patient who had no stone. Desault himself, as well as Cheselden, (Lassus, *Med. Oper.*, t. I., p. 403,) appear to have fallen into the same error. M. S. Cooper asserts that he knows seven instances of this kind, which occurred to different surgeons. M. Moreau has collected most of the cases which relate to this kind of error. I myself have been enabled to ascertain four: in the first case the patient was perfectly restored; the second attempt occurred in the case of an infant, who died; the third took place in a public establishment of the capital, and the patient also succumbed; and the fourth relates to a young confrere who is still living. Now as all these operations were performed by men whose learning and skill cannot be called in question, we may well be permitted to hesitate, when we are compelled to come to a decision under such circumstances.

F. The prudent surgeon therefore, forewarned of these errors, will not decide upon performing lithotomy, without having identified the calculus by means of the sound, not only once, but twice, thrice, or even a greater number of times still, should the slightest doubt remain in his mind, after the first exploration. For greater security he will also take the precaution to have others confirm what he believes to have felt himself.

G. Catheterism may moreover point out to a certain extent under what condition the calculi, it has ascertained, exist, their volume, density, and position, and whether they are movable or fixed. When the stone is felt sometimes at one point and sometimes at another, that it escapes on coming into the slightest contact with it, and that

after having touched it we have some difficulty in finding it again, it is evident: 1st, that it is completely free; and 2d, that it is not of very large size. If, on the contrary, we encounter it on arriving at the neck of the bladder, and that the instrument touches it in whatever direction we make the research, it is evidently very large, unless however it should have become lodged upon the trigonus vesicalis, or in the entrance into the urethra.

H. The *volume* of calculi being an important point to ascertain, attempts have been made at every epoch to discover a mode of ascertaining this point. The catheter may in this respect, when it has once reached into the bladder, impart sufficiently accurate information, if we are much practiced in the use of it. For this purpose it is necessary that the surgeon, without allowing the patient to move, should attentively watch the first contact of the two bodies, and afterwards gently pass the beak of the sound from before backwards, and over the whole surface of the calculus, or he should endeavor to embrace it in the concavity of the instrument, as if for the purpose of bringing it forwards, towards the urethra. When the bladder is empty this manœuvre will frequently answer to convey a proximate idea of the dimensions of the stone. Surgery moreover possesses at the present day other means of arriving at this result. One of the best would be in my opinion the catheter, (*Clinique des Hopit.*, t. II., p. 387,) which I have caused to be constructed, and which will be described further on. This catheter is arranged in such manner that after it is introduced, the two halves of which it is composed, by gliding over each other in the manner of a shoemaker's podometer, transform its beak into a forceps which can embrace the calculus and determine its dimensions. The present lithotritic forceps will still more accurately attain this object. We should be wrong however to suppose that we may always, by means of these instruments, determine with precision the volume of a stone. This could not happen unless it was perfectly round, or that we have satisfied ourselves that we have grasped it in a proper manner. Now the forceps may have embraced the calculi, which are to be extracted by one of their angles or one of their extremities. They may also be embraced too near to the root of the instrument, or only grasped by its extremities.

I. We are authorized in believing that the *stone* is *friable*, and of little consistency, when in striking against it the sound gives only a dull bruit, or when, notwithstanding it is of considerable size, it nevertheless appears to be very light. When, on the contrary, the collision produces a clear sound, and the calculus cannot be displaced but with some difficulty, its density must necessarily be very considerable. When we encounter it always on the same side, and it follows the changes in the position of the patient, and when after having touched it on one point, the instrument may pass around all the remainder of the bladder without meeting with any others, it is probably alone. If, on the contrary, the sound comes in contact with one on the right, and then on the left, and if after having placed the patient on one of his sides, we can feel it no longer in the highest part of the bladder; if during the catheterism we perceive a collision which is distinct from that which the instrument had with the first stone; and if the sound appears to disturb in succession several

movable bodies, we may well be permitted to suppose that there is more than one calculus existing at the same time in the bladder. Nevertheless, we are easily liable to err in this matter, and the most exact researches scarcely furnish any thing more than probabilities, with the exception of certain cases where the fact is self-evident.

J. Nor are the *adhesions of vesical stones*, or their fixity, matters that are very easy to determine. The calculus appears to be immovable, sometimes because it fills up almost the whole bladder, or because of the contraction of this organ, or from the volume of the stone itself, and at other times because it is situated in a cavity, though we may notwithstanding soon after identify it in another region. It may be situated in the urethra at one of its extremities; an arrangement which many observers have pointed out, and which has this remarkable feature, that the stone may make only a slight projection into the bladder, while at the same time presenting a length in the aggregate of several inches. The catheter will ascertain this fact if it meets with a sort of point which can in no wise be displaced, near the neck, and a little outside of and towards the base of the trigonum vesicalis. Moreover, we cannot perceive how it is possible to distinguish by this process those which are confined in accidental pouches, or in small abnormal sacs, from those which have contracted actual adhesions with any part whatever of the mucous tunic. It is the same with this part of the diagnosis, moreover, as with the preceding: the catheterism, if well executed, will afford presumptions, but scarcely ever absolute certainty. Nevertheless, should the stone be imprisoned by one of its extremities in the prostatic portion of the urethra, and project at the same time into the interior of the bladder, an instance of which is related both by Le Dran and M. Blandin, we could satisfy ourselves on this point by introducing the finger into the rectum, while the sound rests against the head of the calculus. We shall, however, have occasion to return to these details in describing the last stage of lithotomy.

## ARTICLE II.—INDICATIONS.

Lithotomy for a long time was the only remedy applied to individuals affected with the stone; at present we must associate lithotripsy with it. Some persons, it is true, get well without these operations, while others suffer so little from their disease that it would be imprudent to cut them; but the spontaneous disappearance of calculi is so rare an occurrence that we are not justified in counting upon it. It is only in those cases in which the calculus does not exceed the size of a grape-seed or bean that they sometimes have been seen to make their escape through the urethra. If there are others which have made their way through the rectum or perineum by ulcerating and perforating the tissues, these moreover are but exceptions which are almost as dangerous as the operation itself. It may happen that the stone from acting only in its quality of a foreign body will, when it is confined in the walls of the bladder or in small accessory pouches, give rise to but very little suffering to the patient, and that its existence may, under such circumstances, not conflict with his life or even the best of health. Cases related also by Deschamps and

many other practitioners, demonstrate that enormous free calculi have not prevented life being prolonged in certain persons to a distant period, or their continuing in a perfect state of health. The Count de Rostaing had two, M. de la Bossière one of four ounces, M. de Lory one as large as a pullet's egg, and M. Dachant one weighing five and a half ounces. An ecclesiastic of Turin, and another patient mentioned by M. Souberbielle, (*Letter to the Academy Royale de Médecine*, 26th May, 1835,) had stones of very large size without having paid any regard to them.

### § I.

None of these exceptions however can weaken the rule, so that as soon as the existence of a stone is positively ascertained, the idea of an operation immediately presents itself. The volume, form, seat, and nature of the calculus moreover, scarcely ever oppose such difficulties to the operation as to compel us to renounce it. The counter-indications are nearly the same as those in all great operations. It is well to remark that as catarrhus vesicæ, the engorgement of the prostate and the greater part of the alterations in the bladder, are very frequently attributable to the presence of the calculus itself, we have some prospect of seeing these accidents disappear after the extraction of this body. A fact even which many authors have already remarked, and which cannot be too frequently repeated, is this, that all other things being equal, lithotomy succeeds better in patients who have suffered much from the stone, than in those who had scarcely perceived it or who have but very recently noticed its symptoms.

### § II.

It would be so much the more important to ascertain at the present day the volume, nature, hardness and contexture of the calculus, inasmuch as the treatment applicable to each case might in this manner be very materially influenced. If, as I saw in an old man in 1833, the calculus should be friable, and as it were an aggregation of grains of sand, or composed, so to speak, of fragments of dried plaster, as in another patient whom I shall mention further on, it is evident that its dissolution and breaking up could be more easily effected and would be more simple than by lithotomy. This friability, which existed in a patient of M. Sanson, (*Mem. de la Soc. Méd. de Gand.*, 1835, p. 93,) and in a patient operated upon by M. Lenoir, (communicated by the author, April, 1839,) is sufficiently frequent to require some notice. Should the stone on the contrary have a foreign body for its nucleus, as I have remarked in several instances, and one hundred and sixty-six examples of which have been collected by M. Civiale, (*Gaz. Méd.*, 1838, p. 269,) lithotomy might become absolutely indispensable. Should the calculi contain a ball, (Larrey, *Clin. Chir.*, t. II., pp. 530, 536,) or a portion of bone or fragment of a barometer or pipe or lead, (*Bull. de la Fac.*, t. VII., p. 180,) difficulties would present themselves in attempting their destruction by dissolution or by lithotripsy. Those which include a pin, (Pétrequin, *Gaz. Méd.*, 1837, No. 42, feuilleton,) a needle, ear of

wheat, lint, a portion of sound or bougie, would be nearly in the same condition. Nevertheless, if the nucleus of the calculus were a pea or portion of a stalk of grass, or a clot of blood, as has been seen by MM. Larrey (*Gaz. Méd.*, 1838, p. 677) and Chelius, (*Clin. Chir.*, t. II., p. 230,) it might yet be practicable to break it up.

### § III.

*As to the treatment of calculi without an operation*, it would appear, at the present day, to have a tendency to come into new repute. Without speaking of galvanism and electricity, made trial of by MM. Gruithuysen, Pravaz, Bonnet, (*Arch. Gén. de Méd.*, t. VIII., p. 254,) and Bellanger, (*Thèse*, No. 105, Paris, 1837,) or of injections, as recommended by M. Thibault, (*Arch. Gén. de Méd.*, t. XI., p. 302,) or of bicarbonate of soda by the method of M. Robiquet, (*Bull. de Ferr.*, t. VII., p. 275,) or of the dissolving liquid which an Englishman, under the patronage of M. Donellan, proposed to me in 1838, I have to remark that the observations and facts published up to the present time by MM. Chevallier, O. Henry, A. Berard, and C. Petit, (*Exposé d'un rapport à l'Acad. Roy. de Méd.*, 1839,) plead already strongly in behalf of the mineral waters of Vichy, used in the form of baths and drinks and injections. These waters, which modify the bladder in a beneficial manner, act by dissolving various kinds of calculi, and by disintegrating others by their influence upon the urine or on the animal substratum which agglutinates its salts. This, therefore, is one of the remedies which are to be made trial of when the stone is not very large, and when there is no opportunity of immediately removing it from the patient.

### ARTICLE III.—LITHOTOMY, (Taille.)

Lithotomy, which has always been associated with the history of vesical calculi, is one of the most ancient operations of surgery and also one of the most dangerous. No one operation, perhaps, has given occasion to so many labors, discussions and efforts of every description. Its object is the extraction through an artificial passage of the foreign bodies arrested or developed in the bladder.

Though the word *taille* may be but little scientific, and, in itself, insignificant, I nevertheless make use of it in preference. The term *lithotomy* has, in these cases, an acceptation wholly objectionable, and that of *cystotomy* is scarcely less objectionable, inasmuch as it is the urethra and not the bladder which is most usually cut into. Everybody, moreover, knows what is meant by the word *taille*, (*cutting*,) and this is sufficient to justify its use. Hippocrates, without describing it, points out this operation at considerable length, and shows that there were then, as at the present day, itinerant surgeons who occupied themselves with no other than this. Moreover, it appeared to be so dangerous and so improper to the father of medicine, that he made his pupils take an oath never to perform it, an oath which, if history is to be believed, was not without its use, inasmuch as certain lithotomists of that time who had been suborned by the usurper Tryphorus, were so depraved as to perform lithotomy on the

young Antiochus VI. when he had no stone, and so as to cause his death during the operation. Celsus, who was the first who has in reality described this operation, endeavors to show that lithotomy is not applicable except to individuals under the age of fifteen years. This is what would appear to have been the doctrine of the Alexandrian school, and also of the majority of authors up to the time of Marianus Santus. From that period it has been performed at every time of life and in both sexes. Formerly lithotomy was performed only in spring-time. It was at this season that calculous patients were assembled in the hospitals, and also in the towns, where they were met by the lithotomists who came to operate upon them. This no longer takes place at the present day. Lithotomy, like all other operations in surgery, is performed at every season of the year; except that the stone is a slow disease, and one in which it is not dangerous in a great number of patients to defer the operation for some months. But as, on the other hand, too cold or too hot a season would appear to be less favorable to its success than the others, autumn and spring continue to have the preference when there is no necessity of any haste. A precaution to be taken before cutting a patient is to ascertain whether the urethra is perfectly free. We sometimes, moreover, accomplish this without any design to do so. In fact it is necessary, in order to ascertain the presence of the calculus, that we should penetrate through this passage. But should it be contracted, the catheterism might be found impossible; in which case, therefore, before having recourse to lithotomy, we should submit the patient to the treatment applicable to diseases and coarctations of the urethra. The other preparative means consist of a bleeding, a few days of light diet, and a gentle purgative, with the view of relaxing the intestines and preventing sanguineous congestions. I have no necessity of remarking that where any accessory lesions exist that are independent of the principal affection, we ought, before all other things, to attend to these and effect their cure. We should never fail to administer on the evening before, or even on the morning of the operation, such an injection as would perfectly cleanse out the rectum. When the operation is once determined upon there is still left an important question to be decided: by what method is it most advisable to extract the calculus? The principal methods are three in number; one which consists in penetrating into the bladder at the perineum; another which gives the preference to the route through the rectum; and the third, which reaches the stone through the hypogastrium.

### § I.—*Perineal Lithotomy, (the lower operation.)*

Lithotomy at the perineum, which is the most ancient of all, has been performed in so many different ways that it becomes indispensable, in order to analyse their processes with any advantage, to unite them together in classes and to assemble those which have the most analogy to each other, in order to form from them a certain number of principal methods. In some of these processes we reach the calculi without dividing the urethra, while in others the most distant portion of this passage is always traversed by the instru-

ment. Among the first are to be classified those which relate to the lateral operation, a method which would appear to include the process of the ancients, that of Frère Jacques, that of Foubert, &c. The median or great operation, whether oblique or by the lateral method of Frère Côme, &c., belong to the second class.

A. *The lateral method, (Cystotomy, properly so called.)—I. The process of Antylus or Paul of Egina, vulgarly known as the little operation.*—The description given of lithotomy by Celsus had been, as it would appear, up to these latter times, the subject of interpretations that were altogether erroneous. The result of this has been that the process known under the name of *Methodus Celsiana*, does not in reality belong to him. We must go to the Greek authors to find the principle of this operation, while the actual process which Celsus adopted, belonged to the school of Alexandria. As Antylus is the first who has given a clear description of it, it is proper in my opinion to designate it under the name of this ancient author. To perform this operation, the surgeon introduces two fingers into the rectum, and endeavors to grasp the stone through the walls of the bladder, while with the other hand he makes pressure upon the hypogastrium, with the view of favoring its descent. Having seized the calculus he pushes it against the urethra, between the anus and the scrotum, and a little to the left of the perineum. He then incises all the soft parts down to the stone, in the direction of a line which would extend obliquely from above downwards and from before backwards towards the left ischium, arrives in this manner into the bladder and expels the calculus through this opening by means of the fingers which have been kept in the rectum. A species of scoop, having points on its interior, is introduced through the wound, in order to seize the stone and bring it to the outside, when the operator has not been enabled to expel it by his fingers. This method, which is known under the name of the *little operation*, on account of its great simplicity, and which subsequently received the name of the *Guydonian method*, because it appeared to have been overlooked until Guy de Chauliac revived the knowledge of it in 1363, was nevertheless described by a number of authors who lived anterior to this last mentioned surgeon. Guy de Salicet, for example, as clearly points it out as Antylus does. Paul of Egina, Albucasis, and most of the Arabic surgeons also so understood it. Ali-Ebn-el-Abbas, among others, explains it in this manner: “ You will take a cutting instrument and incise,” he says, “ between the anus and the testicles, *not upon the median part*, but by directing the instrument towards the *left part* of the thigh. The incision should be oblique, in order that the opening may be large and proportionate to the volume of the calculus.” Ebn-el-Couf, another author of the same epoch, some fragments of whom have been translated by M. Clot, (*Gaz. Méd.*, 1830, p. 167,) gives a description which is in every respect similar. I classify this process under the lateral operation or cystotomy, properly so called, because in following it we cut into, at least in most cases, the side of the neck of the bladder and not into the urethra or prostate. It is easy to conceive, in fact, that the fingers can but very rarely bring the calculus into the prostatic portion of the urethra, and that they must merely secure it upon the trigonus vesicalis, and that it must be

through the walls of the bladder itself that the calculus is depressed to the perineum, and laid bare by the cutting instrument. The objections that may be made to this process are, besides the difficulties of seizing and grasping the stone with the fingers, and of incising with precision the tissues down to the calculus, and effecting its expulsion through so irregular an opening ; that of wounding the bladder itself outside of the prostate and thus exposing to effusions into the sub-peritoneal cellular tissue, and to urinary fistulas, and especially to the wounding of the vesiculæ seminales, without absolutely being exempt also from lesions to the rectum and vessels of the perineum.

II. *Process of F. Jacques.*—I have remarked that the process of *F. Jacques*,—I speak now of his primitive process,—belongs to the lateral method. This singular man, who was at first a simple domestic of *Pauloni*, a Venetian, and who soon after became a monk, commenced his operations at Besançon in 1695. When he came to Paris two years subsequently, recommended by influential persons to the canons of *Notre Dame*, as the possessor of a new method for the extraction of calculi, he was in the habit of using the following process : A cylindrical sound and without any groove was introduced into the bladder ; plunging in afterwards a long knife between the anus and tuberosity of the ischium, *F. Jacques* penetrated into the bladder and enlarged his incision by carrying it obliquely inwards towards the symphysis pubis ; if after having withdrawn his lithotome, the incision did not yet appear to him to be sufficiently large, he increased its dimensions in the direction towards the bladder by means of a second knife of the shape of a scraper ; finally, he grasped the stone with a tenaculum and terminated while exclaiming to the patients, like *Paré* : *I have operated upon you, and may God cure you !*

Every body must perceive at first sight, that *Frère Jacques*, by penetrating on one side of his catheter, avoided entering by the urethra, and that he reached directly into that portion of the bladder which is protected by the prostate, or a little outside of this gland. He divided, therefore, nearly the same tissues as the Greek and Arabian surgeons ; with this difference, that his wound must have been more uniform, at the same time that its dimensions were such that they could be altered with greater ease, according as circumstances required. Experiments made by the lithotomist *Bau-lot* or *Beaulieu*, as he was also called, upon the dead body at *La Charité*, in presence of *Maréchal*, and at the *Hôtel Dieu* under the eyes of *Méry*, show that he was far from cutting down always upon the same parts ; that he frequently divided the rectum or vagina in women, and the vesiculæ seminales in man, and that he especially wounded the side of the bladder at the point where it enters into the prostate, to form the urethra. The shoemaker that *Duchesne* took to him at *Fontainebleau*, and whom he operated on in presence of *Félix*, *Bourdelot*, *Bessière* and *Fagon*, and who was seen walking about the streets at the expiration of three weeks, was notwithstanding, according to *F. Collot*, left with a urinary fistula. Out of 60 patients confided to his care in the two principal hospitals of *Paris*, 13 only were completely cured ; 23 died, and the others were

left with fistulas, wounds of the rectum, &c. As soon as F. Jacques had adopted the modification which was pointed out to him by Méry, Fagon, Duverney, and Hunault d'Angers, and which consisted in making a groove on the convex portion of his sound, his method was in reality no longer the same, and it is to set out only from this point that it can be received among the uretro-prostatic methods, and that it has become the source of a great number of useful improvements. We shall return to it again in speaking of the lateral operation.

III. *Process of Raw.*—Though it were true, as S. Albinus alleges, that Raw reached the side of the bladder without introducing his lithotome upon the groove of the sound, his process would still have to be ranked under the lateral operation, or under the method of Jacques or that of the Arabs; but as history has furnished nothing authentic on this point, it is unnecessary to dwell upon it.

IV. *Process of Cheselden.*—It is evident that the first process, at least, of Cheselden, would come under the same category, inasmuch as the distinguished surgeon of St. Thomas's confined himself at first to laying bare the membranous and prostatic portions of the urethra, in order to divide the parts afterwards from behind forwards, commencing at the neck of the bladder, and without following the groove in the sound.

V. *Process of Foubert.*—The secret that Raw persisted in keeping in respect to the details of his method, which in fact was no other probably than that of Frère Jacques, which had been at first so zealously attacked by him, induced a great number of surgeons to endeavor to ascertain a mode of performing what was called at that time the lateral operation, that is to say, lithotomy at the side of the bas fond of the bladder. After having endeavored to attain this object, by varying the application of the sound, and the extent and direction of the incisions, they succeeded in constructing a method different apparently from all the others, and which Foubert, its inventor, supposed to be that of Raw. This surgeon plunged in a long trochar at some lines distant from the tuberosity of the ischium, and obliquely upwards, inwards, and forwards, until he reached into the bladder. The groove of the instrument immediately allowed the escape of a few drops of liquid externally, which, with the absence of resistance perceived by the operator, served to indicate the entrance of the trochar into the bladder. This groove also served as a director to the lithotome of Foubert, which lithotome consisted of a bistoury from four to five inches long, somewhat convex, and bent near its handle, and on the side of its cutting edge, into an angle of from 20 to 30 degrees. Having arrived into the bladder, this knife was directed in a course parallel to the ischio-pubic branch of the pelvis, that is to say, obliquely from behind forwards, and from without inwards, in order to give to the bladder and perineum a wound corresponding with the presumed dimensions of the calculus.

VI. *Thomas,* a surgeon of Salpêtrière, though he adopted the same ideas, nevertheless deemed it advisable to follow another process; he plunged in his trochar at the place where Foubert terminated his incision, which he did with a view of dividing the parts from

above downwards, and from within outwards, in place of proceeding in an opposite direction, as the inventor of the method recommended is to be done. Moreover, he finally transformed into a kind of concealed lithotome, the instrument which he had made use of for the puncture. Many persons were operated upon by this method, in the hospitals of Paris, and it was also submitted to some trials in England and Germany. Numerous objections, however, were soon raised against it. The direction of the axis of the pelvis, and the deep-seated position of the bladder, do not allow of a trochar being passed through the perineum without danger. Nothing would be more easy in such cases, than to deviate by mistake either in front, posteriorly, or to one side, and thus to wound the rectum, vesiculae seminales, ureters, or peritoneum itself, or to penetrate into the bladder, at too high a point upon its body. To all these unquestionable objections, there is one more to be added, which of itself would be sufficient at the present day to cause the rejection of Foubert's method, were it ever possible for it to be revived. It is that the object itself, which is to be obtained, is an objectionable one. As the incision of the bladder has to be made outside of and above the prostate, between the peritoneum and pelvic fascia, the least quantity of urine effused into the bottom of the wound might give rise to inflammation of the cellular layer which lines the pelvic cavity, and in this manner speedily terminate in death. The previous division of the perineal layers, as has been recommended by Pallucci, in order to allow the forefinger to feel the fluctuation in the bladder before plunging in the trochar, would only remedy the least of its inconveniences. The ingenious sound contrived by Lecat, and which, after being introduced, shut up, may, when opened, stretch the bas fond of the organ, and render the introduction of the principal instrument more easy, would not succeed any better. The instrument contrived by M. Schwartschild, (*Bull. de l'Acad. Roy. de Méd.*, t. III., p. 77,—*Arch. Gén. de Méd.*, 3d ser., t. II., p. 372,) would be still less efficacious.

### § II.—*Median Lithotomy, (the great operation.)*

The processes which comprise in their incision a part of the urethra, and which are the only ones which can be adopted in infra-pubic lithotomy, are also those which have most engaged the attention of lithotomists. It is under these that we shall find the *median taille*, or *great operation*, the *lateralized taille*, or *that of Frère Jacques improved*, also the *transversal taille*, together with all their modifications.

A. *Process of Mariano.*—The method which has been designated under the name of the great operation, in consequence of the numerous instruments that it requires, remained for a long time a family secret. It was, according to all appearance, invented by some of those inhabitants of *ancient Norcia*, in Italy, who had acquired a great reputation as operators, about the 14th and 15th centuries, under the common title of *Norcini*. The archives of Turin, moreover, prove, if we may believe M. Bonino, that Battista da Rapallo, who died in 1510, and was preceptor of Giovani, was the real inventor of this process. However this may be, Giovani di Romani is the

first person to whom history ascribes it, and it was Mariano Santo, his friend, who published it about the year 1520 or 1530. A. Benedetti, however, was probably acquainted with it; for after having announced that we may extract certain calculi without a bloody operation, he says, "Nunc inter anum et cutem, rectâ plagâ, cervicem vesicâ incident." It only became celebrated by the cures of L. Collot, to whom O. Da Villa had taught it, and who on that account was appointed lithotomist to the court of Henry II. At this epoch, the great operation was always kept secret from the public. P. Collot and R. Giraud, who succeeded their relative, were so unfortunate with the ten students to whom they were employed to teach this process by order of the government, that their children alone would have preserved the secret until F. Collot should have thought proper to publish its details, had not the pupils of La Charité and the Hotel Dieu, contrived to make a hole through the ceiling of the operating ward, in order to see them at work, and in this manner to become acquainted with their method. These then are the details of the process: a grooved sound introduced into the bladder, enables us to depress the perineum a little to the left of the raphé, and not exactly upon the median line, as Heister alleges. The surgeon, with a lithotome similar to an enormous lancet, incises the skin, cellular tissue, and muscles, from the root of the scrotum to within a few lines of the anus, then divides the bulb of the urethra, and arrives in this manner into the groove of the sound. A director, which is a sort of stem formed of a male and female branch, differing from each other in this, that the first terminates in a blunt and slightly flattened extremity, while the other is bifurcated in the same direction, is immediately introduced into the bladder in place of the lithotome. The sound, which has become useless, is immediately withdrawn. The female branch of the director, which has remained outside up to this time, is now glided by means of its bifurcation upon the square edge of the male branch, until it has reached into the bladder. The two branches of this instrument being thus fixed upon each other, enabled the surgeon to dilate the wound by separating them at their external extremity, which terminates in a cross, in order to render the manipulations more easy; but their special object was that of guiding the tenacula which were intended to grasp the calculus. Also an ordinary gorget, as well as another instrument called a dilator, formed of two branches, articulated in the manner of a scissors, and which were introduced shut up and opened, by pressing upon the rings which terminated their outer extremity, were sometimes substituted for the above mentioned instruments. The great operation, performed literally according to the details laid down by Mariano Santo, is one of the most objectionable methods that have been invented. The incision evidently had to fall upon the bulbous portion, or in any event upon the membranous portion of the urethra. The dilators could not enlarge the wound without lacerating the prostate. The urethra itself was sometimes completely torn, while its lacerations frequently extended as far as to the neck of the bladder, and the vesiculae seminales. The contusion of the *veru-montanum*, and the lacerations of the ejaculating ducts, involved among their consequences fistulas, or an incontinence of urine, swelling of the testicles, and frequently ste-

rility. The incision into the integuments, if too much prolonged in front, favored the infiltration of blood, urine, or pus into the scrotum. The bottom of the wound, moreover, became in a great number of persons the source of purulent collections, which extended either around the rectum, or towards the pelvis or the upper part of the thighs. The operation, in fine, in its ensemble, was exceedingly laborious, and so dangerous that, according to the editor of the works of F. Collot himself, a cure was rarely effected in the third or half of the patients who had the courage to submit to it.

B. This method has undergone quite a number of modifications. Already at the time of Dionis and La Charrière, the director and dilator were no longer made use of; for after having extensively incised into the urethra, they confined themselves to conducting upon the groove of the sound, a gorget to as far as beyond the neck of the bladder, which gorget afterwards served as a director to the ordinary tenacula. Maréchal and Méry had simplified it still more. After having made their first incision, like the Collots, they plunged the lithotome into the bladder by a combined vibratory movement, executing by this motion what the surgeons at that epoch denominated the *master stroke*, (*coup de maître*,) and in such manner as to divide almost the entire substance of the prostate in its posterior division, (rayon.) D. Schacchi and C. de Solingen had already formally advised that we should cut those parts which Mariano preferred to tear. It is evident that Maréchal, by proceeding in this manner, incised the membranous and prostatic portions of the urethra, and that he was enabled consequently to have an opening of from 8 to 10 lines at the neck of the bladder, and to extract calculi of very considerable size without causing the slightest rupture; he thus obtained a considerable number of cures, and terminated his operation with surprising rapidity. The dilatation by means of the finger, as De la Faye recommended, would have doubtless been less dangerous than the instruments of Giovani, but it cannot be compared to the modification of Maréchal.

C. *Process of Vacca.*—Modified in this manner, the great operation appears to have been divested of so many of its dangers, that a surgeon of repute undertook to reproduce it as a method of his own invention. After having for a long time eulogized and employed the recto-vesical taille, Vacca (*Bull. de Ferr.*, t. VIII., p. 72) finally substituted in its place a modification of the process of Méry. The Tuscan surgeon incises in fact with an ordinary bistoury, upon the median line, after the manner of Mariano, then comes down to the membranous portion of the urethra, and afterwards fixes into the groove of the sound the tongue of his lithotome bistoury and pushes this instrument into the bladder, from the interior of which organ he then brings it out by elevating his wrist and in such manner as to divide the prostate as extensively as he wishes. M. Jameson, (*Bull. de Fér.*, t. VII., p. 274,) who makes use of small forceps-tenacula to extract the calculi, also incises the parts nearly upon the median line.

D. A thesis supported by M. Treyéran. (*Paral. des Dif. Méth.*, &c., in 8vo,) at the beginning of the present century, exhibits another modification of the median operation. The urethra and the prostate are laid open from before backwards; a dry slip of carrot is then inserted

every morning into the bladder through the wound, while the calculus is not extracted until after the extirpation of some days. *Guérin of Bordeaux*, (*Bull. de Fér.*, t. X., p. 276,) who was the inventor of this process, obtained, it is said, decided success from it.

E. The median operation reduced to its greatest simplicity, possesses but one indisputable advantage, which is that of not exposing to the risk of hemorrhage. Vacca, who accords to it moreover the advantage of allowing of the extraction of the stone at the widest portion of the lower strait, had undoubtedly not reflected upon this assertion; for in this respect it can effect nothing more than a great number of other processes belonging to the lateral operation. With the improvements of Méry and Vacca, it is less painful, more rational, and infinitely better in every respect, than when it came from the hands of Mariano; but it is nevertheless the most dangerous of all in respect to the rectum, nor does it allow us to respect the ejaculating ducts. Moreover, as it divides the prostate from before backwards in the direction of one of the smallest lobes of this gland, it does not in reality deserve the eulogies which have been lavished upon it by M. Balardini and by M. Clot, (*Compte-rendu, &c.*, p. 4, 1832,) which latter moreover states that he has performed it in 13 cases with success.

### § III.—*The Oblique or Lateralized Operation.*

It was from having improperly confounded the method pointed out in the work of Celsus, with that described by Paul of Egina and Antylus, that the error also was finally committed of confounding the lateral method, such as it was first performed by Frère Jacques, with the lateralized operation, which has since been so extensively introduced into practice. A great difference however exists between these two modes of proceeding. In one the incision is principally designed to come down upon the side of the neck of the bladder, without necessarily involving the urethra; in the other, on the contrary, the posterior portion of this passage is always divided, while the bladder itself may, if necessary, be respected. The lateralized operation consists essentially of an oblique incision into the prostatic portion of the urethra, comprising at the same time a more or less considerable extent of the membranous portion of the same passage. The only processes therefore which belong to it are evidently those in which the operator makes use of a grooved sound to direct the cutting instrument into the bladder.

A. *Process of Franco or of Hunault.*—The idea of the oblique method has so little to do with F. Jacques, that this monk did not adopt it, but because of the representations of his antagonist, and not until after it had been very clearly described by Franco, as well as by F. de Hilden. Franco (*Thèses de Haller*, t. III., French transl.) states positively, that in order to incise the perineum in lithotomy, a curved and grooved sound must be previously introduced into the bladder, that this sound is to be used as a director to the bistoury, and the neck of the bladder to be divided obliquely from within outwards, and in the direction towards the ischium. It is true that he recommends, like Tarin, (*Ibid.*, t. II.,) that this incision should be

made to the right, but it is possible that in expressing himself in this manner, he meant to the right of the surgeon, which would correspond to the left of the patient. G. Fabricius evidently adopted the same rule, which had already been recommended also by A. de la Croix. It is to Hunault of Angers, however, that we are most indebted in this matter. Certain plates which he had executed, but which have never been published, demonstrate that by means of the grooved sound we will always be sure of incising the same parts. It was after having adopted his advice that F. Jacques, in 1701, was enabled to operate upon 38 calculous patients, at Versailles, without losing a single one, and also upon the 22 patients collected by the Maréchal de Lorges, at his hotel in 1703, and it was also by this operation that he obtained such brilliant success in Holland, and again upon his return to France.\* However this may be, public attention having for a time been diverted from its legitimate object during the first half of the last century, was not enabled to comprehend at first all the importance of the grooved sound, and of the oblique operation, properly so called.

B. *Process of Garengeot and Perchet.*—Garengeot, who discovered it while making with Perchet, a surgeon of La Charité, trials upon the dead body, and put it into execution in the case of a child eight and a half years old, in 1729, while Morand had gone to London to learn it of Cheselden, is the first person who appears to have re-established the oblique operation for lithotomy upon the principles which Hunault had first laid down. The sound being introduced into the bladder is consigned to an assistant, who presses it towards the left side of the perineum. The surgeon makes an oblique incision from the raphé to the middle of the space which separates the ischium from the anal opening, with an ordinary bistoury or lithotome. This incision, which ought to commence at about an inch in front of the anus, comprises the integuments and the sub-cutaneous layer. The left forefinger afterwards serves as a guide to the cutting instrument, while we divide the other tissues, layer by layer, and open into the urethra. The lithotome, glided from above downwards or from before backwards upon the groove of the sound, penetrates into the bladder while cutting through the prostate obliquely outwards, backwards, and to the left; after which the surgeon makes use of this knife to enlarge the whole wound while withdrawing it, and by making pressure upon it with a greater or less degree of force. In order to favor the entrance of the lithotome as soon as the membranous portion of the urethra is laid open, the operator directs the assistant to depress a little the plate of the sound or depresses it himself, in order to elevate its concave portion behind the pubes, at the same time that he more or less inclines the wrist of his right hand downwards. By this means we run no risk of making a mistake, and the bladder escapes from any danger of being wounded.

C. *Process of Cheselden.*—Morand, in describing the process of

\* F. Jacques did not die in 1713, as is asserted by Sabatier. Having arrived from Rome at L'Etendonne, or, according to Normand, at his native town of Arbigne in June, 1714, he went to pass several months at Besançon, and afterwards remained a sufficiently long time among the Benedictines to build there a small house, which he subsequently abandoned in order to reside with his friend L. Décart, where he died, aged 69 years, and consequently in the year 1720, since he was born in the year 1651.

Cheselden, conveys nearly the same idea that Garengéot does, of the lateralized operation; except that it would appear that his principal object after having divided the prostate, was to respect to a considerable extent the other tissues, and to make a wound from the bladder to the perineum, similar to a sort of oblique canal, from behind forwards. Cheselden, moreover, has frequently modified his process of lithotomy. His first method is the one which I have above described, while speaking of the lateral operation, and his second method is the one which Morand made known. The third, or the one which he finally fixed upon, is very different from the ideas that are generally entertained of it in France. The English surgeon gave in every case an extent of from two to four inches to his external incision, an incision which was made to fall between the bulbo and ischio-cavernous muscles, and to lay bare the urethra as far up as to the apex of the prostate. The second stage of the operation comprised the incision of the deep-seated parts, exposed to view by the first. To execute this, Cheselden pushed the anus with force to the right, and backwards, by means of his left forefinger placed in the posterior angle of the wound, then glided upon the nail of this finger a bistoury which was slightly concave, penetrated up to the neck of the bladder, while following the anterior side of the rectum, and came down upon the groove of the sound, when he divided from behind forwards, and from below upwards the whole extent of the prostate gland, by drawing his lithotome towards him, the cutting edge of which was turned towards the symphysis pubis. The method of Cheselden is, as we perceive, very distinct from the oblique or lateralized operation, followed by the French practitioners. It is true that it divides the same parts that Garengéot's does, but while it apparently puts him better on his guard against any injury to the rectum, it in reality creates only greater difficulties in the manipulation.

D. *Boudou*, who also performed the lateralized operation, and even before perhaps any person had described it at Paris, made a process from it which does not differ from that of Méry, except in the direction which he gave to the wound. De la Faye in fact says, in the additions he has made to the treatise of Dionis, that Boudou inclined the plate of his sound towards the right groin, and that after having incised the membranous portion of the urethra, he plunged in the lithotome along the groove of the director, which was then raised up in the direction of the pubes, until he reached beyond the neck of the bladder, and that he divided the prostate obliquely to the left, by bringing back towards him the cutting instrument.

E. *Process of Le Dran*.—Le Dran also was desirous of having his own process. After having incised the urethra, he introduced a large grooved sound into the bladder, and immediately withdrew the catheter, and terminated by dividing the prostate with a convex bistoury, which was a sort of a buckler-shaped instrument (*rondache*) guided upon the sound, and which was about six lines in breadth. Though almost insignificant in itself, and calculated rather to embarrass than to simplify the operation, this modification, nevertheless, has had its partisans. Schmucker (*Bibl. Chir. du Nord*, p. 39,) says that no patient will die from this operation if it is well performed. A. Burns adopts the principle of this process, with this difference, that a bistoury

or ordinary lithotome appears to him to be preferable to the rondache of Le Dran. M. J. Bell, who is of the same opinion, incises from the prostate towards the first opening of the urethra, like Cheselden, in the place of directing his bistoury from before backwards, in the manner of Le Dran; and M. Allan, who, like his countryman also directs the point of the bistoury upon the sound, by passing behind the prostate, prefers to withdraw the two instruments at the same time, by holding them firmly against each other in the same way, as is very frequently done in the operation for fistula in ano. It would be difficult to discover in what manner lithotomy is rendered more convenient, or less dangerous, by these various modifications of the principal process.

F. *Process of Lecat.*—A mode of performing the oblique or lateralized operation, which made some impression in its time, was that of Lecat. The sound of this operator terminated in a handle instead of having a plate. The instrument he made use of to lay bare and incise the urethra, had a lateral notch near its back, and received from its inventor the name of *uretrotome*. Lecat conducted, by means of this last, another instrument terminated in a blunt extremity, into the groove of the sound, in order to cut through the prostate, nearly in the same manner as in the second process of Cheselden, that is to say, in the one described by Morand. The cutting edge of this second bistoury, however, which was called a *cystotome*, was never to go beyond the vesical bourrelet, which is found at the entrance of the urethra, for which reason precisely the name of cystotome was in no way applicable to it. Finally, the surgeon of Rouen had at one time the idea of replacing his cystotome by a concealed lithotome, which he denominated a *cystotome-gorget*. His axiom was *a small, deep incision, and a large exterior incision*. It is perceived that he already foreshadowed the dangers of going beyond the limits of the prostate, and that he preferred dilating rather than incising the entrance into the bladder. His method, which has not been generally received, though he obtained unquestionable advantages from it, nevertheless, continued to be adopted by some practitioners. Pouteau, who had slightly modified it, obtained such decided success from it, that in the hospitals of Lyons it is still employed quite frequently.

A surgeon of Venice, M. Paiola, who has complicated it still more by adding another instrument to those of Lecat, has, it is said, employed this process in 500 cases, and without losing a single patient! This assertion is so extraordinary, that had not Langenbeck spoken of its author in terms of eulogy, it would not have deserved the slightest attention. We perceive in the thesis of M. Dumont, that at the hospital of Rouen, M. Flaubert also adopts the axiom laid down by Lecat, and that in his opinion a small incision with free dilatations is a precept which the surgeon should never lose sight of. Delpech also thinks that there is less danger in dilating or even lacerating the neck of the bladder than in incising it extensively, and that in this respect Lecat's rule ought to be retained as a law. There is under this precept an important truth, which could not be properly appreciated until in these latter times, because the anatomical fact connected with it had not been clearly indicated : it is this, that *lithotomy*

*confined within the limits of the prostate is infinitely less dangerous than that in which the incisions are extended beyond this gland.*

G. *Process of Moreau.*—Moreau, a surgeon of the Hotel Dieu of Paris, rejected all these complications and performed the lateralized operation in the following manner. His lithotome resembled, to a certain extent, the ancient lithotome of Collot. He made an extensive incision into the skin and sub-cutaneous cellular tissue ; laid open the membranous portion of the urethra ; elevated the sound behind the pubis at the same time that he plunged the bistoury into the bladder ; strongly elevated the wrist of the right hand, in order to incise the prostate obliquely, and afterwards depressed it, in order to replace the cutting edge of his knife backwards at the moment when he brought it out to the exterior. Moreau's object was to have a large opening at the neck of the bladder, in order to extract the stone from it with facility ; an opening still larger at the integuments, in order to prevent infiltration or abscesses ; and to incise but to a very small extent the intermediate parts, in order that he might avoid the arteries of the perineum, which are chiefly found in that part, and in order also to respect the rectum ; so that the wound in his operation would represent a double triangle, the strangulated portion of which was at the middle of its length.

H. *Process of F. Côme.*—A modification of the lateralized operation, which warmly interested the surgical world, is the one of which Frère Côme gave himself out as the inventor in 1748. This ecclesiastic had contrived an instrument which, being introduced closed, through the incision of the urethra, into the bladder, was opened by the pressure made upon a movable piece at its outer extremity, and divided the prostate from within outwards, at the moment it was withdrawn. This instrument, which has since been known under the name of the concealed lithotome, was at first supposed to possess numerous advantages. Its handle, cut into faces, and numbered by the figures 5, 7, 9, 11, 13, 15, was arranged in such manner, that by turning either of these figures towards the movable piece, we were sure of having a corresponding opening in the direction of its vesical extremity. We thus know in advance before introducing it, and in a positive manner, that it will incise the neck of the bladder, to the extent of 7, 9, 11, 13, or 15 lines, according as we have selected one or another of the dimensions indicated. Franco speaks of an instrument of the same kind, and the concealed bistoury of Bienaise does not differ materially from it. The objection made to it was, that it was liable to escape from the groove of the sound, to slip between the bladder and the surrounding parts, to wound the rectum at the moment when it is withdrawn, to divide the pudic vessels, and especially to perforate the bladder itself as soon as this has emptied itself through the wound in the perineum. It was to remedy this last inconvenience that Caquet, a surgeon of Rheims, gave it a blunt point. Moreover as it has, when rigidly examined, the advantage only of incising to a determinate extent the same parts that are divided with the other lithotomes, it has in turn naturally been both praised and rejected, and apparently with reason. Those surgeons who are little practised in great operations, who are not sure of their hand, and who are not perfectly acquainted with the

anatomical relations of the perineum, but who nevertheless dare to perform lithotomy, may, and even ought to give it the preference. The lithotome gorget, formed of two pieces, which are movable on each other, and which Bromfield proposed to substitute for it, is infinitely more defective. As to the modifications which have been given to it by M. Evans of London, and sundry operators in France, and which relate almost exclusively to its handle and movable piece, they are of too little importance, and too evidently matters of mere taste to render it necessary that I should describe them in this place.

I. Frère Côme, down to the incision of the membranous portion of the urethra, proceeded in the same manner as in the ordinary lateralized operation. The lithotome, directed on the nail of the left forefinger into the groove of the sound, was immediately to be introduced, shut up, into the bladder. The surgeon then himself seized the sound with his left hand, in order to depress its plate and to elevate its concavity behind the pubis, while with his right hand he pushed forward upon the groove of the sound, the point of the concealed bistoury, which by this means was conducted into the bladder. The sound being now no longer necessary, was immediately withdrawn from the urethra. After having again satisfied himself of the existence of the calculus, which may be readily touched with the extremity of the lithotome, the operator seizes the stem of this instrument with his left hand, between the thumb and forefinger, in a state of semiflexion; opens it by making pressure with his right hand upon the movable piece; pushes its back firmly, and a little to the right, against the symphysis pubis; directs its cutting edge backwards and to the left; withdraws it by elevating moderately its handle, until its blade has passed through the prostate; loosens at this moment its movable piece; allows it to shut up again by degrees; and depresses it more and more, and in such manner that, from the neck of the bladder to the integuments, its cutting edge shall to some extent have circumscribed the half of a circle, the convexity of which would be turned forward very nearly in the same way as in the process of Moreau.

J. *Process of Guérin.*—F. Côme is far from being the only person who has proposed a particular kind of instrument to diminish the dangers of lithotomy. Since his time there have been also a great number of others contrived, the object of some of which has been to give greater certainty to the opening into the urethra, and that of the others to incise the prostate or neck of the bladder with less danger. Among the first are to be found various sorts of sounds, that, for example, of Guérin, which is constructed in such manner that when it is once introduced, its outer extremity is depressed to such extent as to face directly towards its most convex portion, that is to say, the groove of its urethral half. This sound, moreover, terminates in a sort of head which is pierced with a hole, through which a long trochar grooved upon its lower side, may be introduced, and which being directed upon the perineum necessarily falls into the groove of the sound itself without any danger of deviating. It is perceived that the incision of the external soft parts then becomes a matter of extreme facility, and that the laying open of the urethra is no longer attended with the slightest degree of difficulty. In other

respects the operator proceeds in the same manner as has been mentioned in speaking of the median operation. An instrument which hardly differs from that of Guérin except in being formed of two halves, which are articulated by a hinge outside, has been introduced into practice in England by M. Earle, to effect the same object as that of the practitioner of Bordeaux. Deschamps proposes a third which also belongs to the same description, and M. Smith (*Baltimore Med. and Surg. Journ.*, April, 1832,) has contrived a fourth which does not differ materially from that of Guérin. If the opening into the urethra were really the difficult point in the operation, these kinds of sounds would perfectly carry out the intention. But though the operator may have ever so little knowledge or skill, this is never the stage in lithotomy which embarrasses him. Consequently the instruments of MM. Guérin, Smith, and Earle will continue to be, like so many others, a matter of taste and personal convenience. The ordinary sound, in which M. Chas. Bell has placed the groove upon the side, in order to be enabled while leaving it upon the median line, to incise obliquely to the left on reaching the prostate, is, in fact, only calculated to increase the difficulties of the operation. As to the straight sound extolled by M. Zaviziano, (*Mem. sur l'Usage de la Sonde Droite*, 1832,) or the one which is but slightly curved backwards to the extent of half an inch near its point, like the one employed by M. Key, this also does not appear to me to possess any real value or decided advantage over the others.

K. *Lithotomy with the bistoury.*—The instruments devised with the view of rendering the opening into the bladder more easy and secure are of two kinds. There are those, in fact, which differ only by slight modifications from ordinary bistouries, while others, in reality, constitute special instruments. Thus the lithotome of Cheselden, which is slightly concave on its back, was modified by A. Dubois into a small knife with a fixed handle, but which in other respects scarcely differs from the convex bistoury. In England, Blizzard made use of a long narrow bistoury with a fixed handle, like that of the French surgeon, and the point of which terminates on the back by a kind of blunt probe. Klein, Langenbeck, Kern and Graefe in Germany each, also, have their own lithotome, which, like those above, are to be ranged in the class of simple knives or modified bistouries; but to whoever shall examine this matter attentively it will appear evident, that all this is a mere optional affair, and that it is almost a matter of indifference whether we adopt one or the other of these instruments, all of which might, if necessary, be advantageously replaced by the simple or blunt-pointed bistoury. It is now a long time also since Dupuytren, M. Mott and a number of the London surgeons made this remark, viz., that the ordinary straight bistoury is full as well adapted as the most complicated lithotomes for penetrating into the bladder, and for dividing in a proper manner the prostate as it comes out, provided it is conducted by a skilful hand. Dupuytren even has performed lithotomy by plunging the straight bistoury by puncture down to the groove of the sound and then into the bladder, in such manner as to divide at the same time while withdrawing it, both the prostate and the entire mass of tissues which form the perineum. This process, which assimilates lithotomy

to the simple opening of an abscess, is more easy than is supposed. I have frequently made trial of it upon the dead body while going through the operations before the students: but as it cannot have, in reality, any other advantage than that of abridging the operation by the space of about half a minute, I do not think that prudence would allow us to establish a manipulating display of this kind as a law in surgery. If, however, we should decide upon using a simple bistoury, we should open the urethra in the ordinary mode, and afterwards glide the instrument upon the groove of the sound, by proceeding in the same way as with the other kinds of lithotomes. It would be in such cases that my double sound with an eye would be applicable. The special instruments which remain to be spoken of are known under the common title of gorgets.

L. *The process of Hawkins.*—The first gorgets employed in lithotomy were nothing more than a simple gutter terminated at one end by a probe or button, and at the other by a kind of handle. They were made use of to replace the sound, and are also employed in almost every kind of lithotomy in order to give greater facility to the introduction of the tenacula. Under this form they have blunt rounded borders, in order not to incur the risk of wounding the parts. It was not until about the middle of the last century that Hawkins, an English surgeon, suggested the idea of transforming the gorget into a lithotome, that is to say, to give one of its borders a cutting edge near the point. This instrument, which most English surgeons adopted, is employed in the following manner: As soon as the surgeon has opened through the membranous portion of the urethra, he seizes the gorget by its handle and applies its button into the groove of the sound and pushes it into the bladder, taking care that it does not let go its hold upon the last mentioned instrument, which, by a vibratory movement, is to be raised up behind the pubis, in proportion as the gorget divides the left side of the prostate. The apparent simplicity of Hawkins's gorget did not prevent its partisans themselves from noticing its defects. Bell, perceiving that its blunt portion was too large, made it small in order to prevent it from lacerating or contusing the parts. Desault dispensed with its concavity, placed its button altogether to the right and upon its blunt border, and in other respects adopted the modification of Bell. Blicke, fearing that it might escape from the sound and get in between the rectum and bladder, instances of which MM. A. and S. Cooper state that they have frequently been witness to, arranged the button in such manner that it could not escape until it had arrived near the extremity of the groove of the sound. That of Abernethy, so to speak, resembles a triangular gutter, as is noticed also in the gorget of Cline, or a semi-cylindrical canal like that of Hawkins. Dorsey has given the figure of one, the blade of which, which can be easily detached, has in every part of it the same width, and the free extremity of which, cut obliquely like that of Desault's kystotome, is the only part which has an edge. Finally, Scarpa, who avowed himself a partisan of the gorget, has gone to a great length to demonstrate that it ought to have a very narrow cutting edge of the extent of two lines near its button, becoming gradually wider until it has acquired a transverse diameter of about seven lines, and that this

cutting edge ought to be bent into an angle of sixty-nine degrees to the border which constitutes its back, in order that while cutting through the prostate, it may make in this gland a wound, whose angle should also be sixty-nine degrees, in relation to the axis of the urethra. Some English surgeons, among others Dease and Mair, supposed that there would be greater security given in the employment of the gorget by making use of Le Dran's sound for its director; but this proposition has not had and could not have any advocates. In France the gorget has found but a very small number of admirers, and M. Roux is almost the only person who makes use of it in Paris. The most simple reflection will be sufficient to show the little importance, I might say almost the insignificance, of the various modifications which it has undergone. It is the gorget as a special instrument, and not the gorget in particular, which is the important one to be examined; and I am surprised that authors of so much repute should have wasted so much time in discussions relating to this subject. It is certain that with the gorget we never can wound the rectum or pudic artery, unless there should exist some anatomical anomaly; and also that we cannot go beyond the limits of the prostate. But as the only reason of these advantages lies in the small extent given to the incision, it is clear that we could obtain the same result from any lithotome whatever, provided we restricted ourselves to a wound of from six to seven lines. Its inconveniences are that it always makes a passage of the same width whatever be the volume of the stone; that it exposes more than any other instrument to the danger of wounding the posterior wall of the bladder, or even transfixing this organ, as M. Earle says he has seen, and especially of dividing the tissues by pushing them before it, and by separating the different layers of the perineum from one another, of relaxing them to some extent in the place of stretching or pressing them from above downwards, in the way for example it is done by the concealed lithotome, and by almost all the cutting instruments made use of by different surgeons in this second stage of the operation. Finally, that it dilates and contuses at the same time that it divides, that it obliges the operator to have several of different dimensions, and that it does not allow of an incision of more than eight to nine lines in extent. One of its advantages, perhaps, which is the most positive though it has not been noticed, is to be found in the direction which it gives to the incision of the prostate, an incision which is semilunar, the convexity of which is turned backwards and to the right, and the arc of which having a cord of about seven lines, may be enlarged without laceration to the extent of two to three lines, when we proceed to elongate it while extracting the calculus. Under this point of view the gorget of Desault is evidently the least convenient of all; for to attain the object in view it would be necessary, while increasing its breadth at the cutting part, to preserve its primitive gutter-like or semi-cylindrical form. In this respect, moreover, it would no longer be applicable to the lateralized or oblique operation, properly so called. The incision would be rather transverse than in the direction towards the left ischium; from whence would arise another inconvenience, since we should incise upon a segment of the prostate, which would be less in length than that

which would have been incised in the process of Frère Côme, Cheselden or Garengeot.

M. *Process of Thompson.*—The deviation from the line originally contemplated for the lateralized operation, is however not the only one which has been proposed. In 1808, Thompson also, with the view of avoiding the rectum and perineal arteries, suggested that we should incise with the ordinary lithotome, not downwards, but in fact upwards, and a little to the outside, provided an incision of some lines backwards should not be found to be sufficient to allow of the extraction of the stone. Nearly about the same time, *Dupuytren*, for the purpose of avoiding the same organs, deemed it advisable to carry his incision almost directly upwards; that is to say, having arrived into the bladder, he turned the cutting edge of his bistoury, or of the lithotome of F. Côme, upwards, and a little to the right, and parallel to the ischio-pubic branch of the pelvis, as if for the purpose of reaching up to the symphysis. M. Pantaléo, (*Gaz. Med.*, 1834, p. 411,) who incises the prostate posteriorly, and to the left, and then in front and to the right, has in reality done nothing more than to reproduce the suggestion of Thompson. These modifications have had to be abandoned, even by their authors themselves, since in such processes we divide the prostate in that direction where it has the least diameter, and that we almost unavoidably go beyond its limits, and for the still greater reason, that we are obliged to extract the calculus at a narrower part of the lower strait than in the posterior oblique operation.

N. *Process of Boyer.*—Boyer, who almost always used the concealed lithotome, and who was considered very fortunate in his operations for stone, did not make his incision in the direction of any of those lines which have been above indicated. In place of resting the back of his instrument against the symphysis, he held it firm against the right ischio-pubic branch, so as to be enabled to direct its cutting edge almost entirely transverse and to the left while withdrawing it, and to divide the prostate from within outwards, in the same way as every person does. When we proceed in this manner, we run no risk of wounding the rectum or pudic artery, any more than we do the transverse artery, whose course is nearly parallel to that of the incision, so that the superficial artery is in reality the only one which could be in any danger. A modification of this kind would be free from all objection, if we were not obliged to divide the prostate in the direction of one of its shortest diameters, or if it were possible to give an extent of more than 7 or 8 lines to this division without going beyond the circumference of the gland. The lithotome directed in this manner, presents in fact all the advantages of the gorget, without being attended with its inconveniences.

O. *The Author.*—If it be true, that the question to be solved in the oblique operation for stone, is that of dividing as extensively through the prostate as possible, without passing beyond its periphery, the incision directed downwards and outwards, is evidently the only one which ought to be adopted. According to this hypothesis, the process of Thompson, and that which Dupuytren was desirous at one time of introducing into practice, would no longer be worthy of any consideration. The rule adopted by Boyer, which allows the cutting edge

of the bistoury to be inclined a little towards the ischium, is infinitely preferable. For the extent of a line perhaps, that it makes us lose at the place where the prostate would be opened, we procure in compensation incontestable advantages in relation to the rectum and arteries. As to the incision made after the manner of Boudou, Garengeot, Morand, Le Dran, Moreau, Dubois, and J. and Ch. Bell, or after all those in fact who prefer the bistoury to particular lithotomes, and whose object is to make a large opening into the neck of the bladder, it is a matter almost of indifference whether we imitate one or the other, so long as we take care to give a sufficient extent to the incision through the integuments and the other tissues composing the perineum. The method of Lecat presents two points for consideration: 1st, the instruments which the inventor made use of, and which may be replaced by an infinite number of others; 2nd, the suggestion that we should make only a small incision in entering into the bladder. It is under this point of view only, that the operation of Lecat is worthy of being distinguished. De la Motte had already maintained that there is less danger in dilating or even lacerating, to a certain extent, the entrance into the bladder, than by incising it. Moreover, the justice of this position can scarcely be called in question. The error of those who have defended it, is that of not having comprehended its fundamental principle, and of having given too extravagant an extension to it. In fact the small incisions mentioned by Lecat have no other advantages over the great ones, except that they enable us to restrict ourselves to the periphery of the prostate, from whence it follows that the other operations would not expose us to any more danger, provided that we did not go beyond the contour of this gland. I have mentioned above, what estimation is to be placed on the gorget and its different varieties. There remains to be considered, the instrument of Frère Côme, which, it cannot be denied, offers in reality a great degree of security, an extreme simplicity in its construction, and the advantage that it can be employed with more facility than the bistoury, by the greater number of operators. As the principal dangers of the oblique operation are the lesion of the rectum, of the pudic artery, and of the transverse or superficial arteries, all the instruments, with the exception of the gorget, are under this point of view attended with nearly the same inconvenience. Provided we can satisfy ourselves in respect to the condition of the intestine, by introducing our finger into it, and that we have taken care not to give too great dimensions to the deep portion of the wound, and have conducted the lithotome with some adroitness, we shall not wound it. As the pudic artery is always situated upon the contour of the pubic arcade, and consequently considerably beyond the limits of the prostate, it does not in reality run any risk of being wounded. As the superficial artery has its seat in the sub-cutaneous layer, it could be too easily seized, twisted, tied or cauterized to make its division a matter of any apprehension. The transverse artery of the perineum, which is ordinarily quite small, will not be avoided with certainty, unless the incision of the urethra should not commence too near the bulb or too far from the prostate. Fortunately the hemorrhage which results from it is rarely sufficiently abundant to be a matter of serious importance. It can

only be, therefore, in cases of anomaly or deviation in the direction of these vessels, or of their preternatural size, where any danger can exist under this point of view, in practising the lateralized operation. A more serious difficulty by this method, is that of being only enabled to obtain an opening at most of from ten to twelve lines, and which is consequently too small to allow of the extraction of large sized calculi. It was with a view of remedying this real inconvenience, and independently of all processes and all operators, that the following method has been warmly approbated.

#### § IV.—*The Transverse (bi-lateral or bi-oblique) Operation.*

Another interpretation of Celsus has given rise to a new operation in lithotomy. In speaking of the extraction of calculi, the Roman author recommends that we should make *juxta anum, cutis plaga lunata, usque ad cervicem vesicæ, cornibus ad coxas spectantibus paululum*, and then that the instrument must be brought back to the bottom of this first wound, in order that we may make another, which is to be transverse, and which opens the neck of the bladder in penetrating down to the calculus. Now it is this passage, hitherto explained in such manner as to refer to it the origin of the lateral operation, and the lateralized operation as well as the little one formerly described by the Greeks and Arabs, which, when brought back to its legitimate signification, has suggested the idea of the new method. The expressions *plaga lunata* and *plaga transversa* had, it is true, in more than one instance embarrassed the commentators of Celsus; but in putting the singular in place of the plural, and by translating *ad coxas* as *towards the thigh (vers la cuisse)*, they supposed that they had overcome the difficulty. It was in vain that Davier made Cochu sustain, on the 15th April, 1731, at the Faculty of Paris, that in the operation of Celsus, we are to make upon the skin near the anus an incision in the form of a crescent, the extremities of which are to be turned towards the thighs; that Heister made Ilsmand repeat the same phrase, in November, 1744; that Normand de Dole, who complained, in 1741, of the little attention paid to the reading of the ancient authors, recalled to mind that in the operation of Celsus, the incision, which was of a crescent form, should have its horns turned slightly towards the thighs of the patient, and that the same interpretation was again given by Macquert in the thesis which he supported in April, 1754, by Portal in his *Precis de Chirurgie*, published in 1768, and by Deschamps himself, in his treatise on stone; nobody took the trouble to derive the slightest profit from it. A second difficulty which Bromfield had in vain endeavored to remove, had undoubtedly been the reason. This was to ascertain if the words *cornibus spectantibus paululum ad coxas* ought to be understood to mean a semilunar wound, whose extremities should be turned forwards rather than backwards. All the authors whom I have just quoted have, as we perceive, adopted the first version. Bromfield alone inclined to the second, which appears in fact to be the true signification, inasmuch as the word *coxas* among the ancients was generally applied to the large bones of the pelvis, and to the ossa ischia in particular. However this may be, it was not until

at the beginning of the present century that the question was examined in a correct point of view.

In the year 1805, M. Morland recalled in his thesis the trials made by Chaussier on this point, essays by which it was proved that a semilunar incision, with its concavity posteriorly, would enable us to enter into the bladder and to extract the calculi from it. Nevertheless, it was still labor lost. Chaussier himself had forgotten his own researches, when in 1813 Béclard reproduced them almost in the same terms as M. Morland, and with full as little success. The cogent and entirely conclusive arguments adduced in 1818, by M. Turck, in favor of the same principles, did not any more succeed in changing the direction of the public mind. But in 1824, Dupuytren, whose attention was occupied with the subject of rendering lithotomy less dangerous, having had the same idea as Chaussier, Béclard, and M. Turck, and almost immediately making an application of it upon living man, was soon convinced that this method contained a precious process for the operation of stone. Béclard, without attaching so much importance to it, and who moreover had never overlooked it, but, according to M. Olivier d'Angers, had occasionally already used it in practice, again described its advantages before the Academy, while Dupuytren, at the Hotel Dieu, demonstrated its extreme value. Since that epoch, a great number of surgeons have adopted it, and it is now reckoned among the best methods.

A. *Process of Chaussier.*—We perceive by the thesis of M. Morland, that Chaussier, after the mode of M. Ribes, began by incising all the soft parts between the anus and the bulb of the urethra, with the point of a scalpel; that he had had the idea of a sound with a double groove, one on the right and the other on the left, in order to be enabled to divide the membranous and prostatic portion of the urethra, on one side only, or on both sides in succession, should the volume of the stone appear to require it; that in his opinion a grooved sound could replace this instrument, provided that by introducing it into the wound, it would be easy to incise upon it to the left and then to the right; that he also had had the idea of a concealed lithotome with a double blade, and of the sheathed scalpel of Louis; but that he took care to make the remark, that in such cases, the best of instruments was the mind, guided by an exact knowledge of the situation and nature of the part.

B. *Process of Béclard.*—The instrument which Béclard selected is a sort of gorget of some breadth, slightly concave, cutting upon its two edges, and terminated in a tongue in the direction of its convexity. He also speaks of the double lithotome, leaving every one at liberty to adopt it or to dispense with it. He finally had made, in order to carry out the same indication, a knife of a sage-leaf form, and nearly similar to the lithotome of Cheselden. He incised the skin and the other tissues, moreover, in the same manner as Chaussier.

C. *Process of Dupuytren.*—Dupuytren, for the purpose of performing the transverse operation, contrived two particular instruments; first, a fixed bistoury, or sort of scalpel with a cutting edge on both sides near its point, to the extent of some lines; second, a double lithotome, which might have been suggested by a phrase in

Franco, and which is very accurately represented by the cutting tenaculum of Tagault, figured at page 366 of the additions of Joubert to the work of Guy, printed in 1649 ; one which Fleurant had mentioned, in speaking of lithotomy in women, of which Lombard, (Thomassin, *Corps Etrang.*, &c., p. 103, 1788,) has given the description and figures, which Chaussier and Béclard had also thought of, but which it was reserved for Dupuytren to bring into repute and to render as simple as possible. M. A. Stevens and M. Amusat, finding it still too complicated, have proposed to employ in its place a sort of scissors, with cutting edges on their borders when opened, but which are blunt when shut ; but these scissors are not capable of fulfilling all the indications which we have in view in making use of the double lithotome. It is not in fact a simple transverse incision which the surgeon ought to think of making, but this incision should at the same time be oblique in the direction backwards and outwards on each side, in order that it may embrace at once the two largest portions of the prostate. Dupuytren, who had early felt the necessity of this, has found every thing that he could desire in this respect, in the modifications which M. La Serre, and especially those which the ingenious cutler M. Charrière has given to his original lithotome. Finally, in place of the ordinary sound, Dupuytren has contrived one which is dilated, as it were, at its greatest convexity, in order that it may make greater distension upon the urethra, and the groove of which is more flaring and has less depth at its extremities, than in its middle portion. The patient is arranged in the same manner as in all the other operations for lithotomy. The surgeon, placed in front of the perineum, stretches the integuments with his left hand. With a scalpel in his right hand, he makes the semilunar incision ; commences it near the right ischium ; extends it to six lines in front of the anus, and terminates it on the inner side of the left ischium, in order that its horns may fall on the middle point of the space, which on the right and on the left separates the anus from the tuberosities of the ischium. He thus divides in succession the different layers which present themselves, keeping rather on the median line, until he arrives near the membranous portion of the urethra, which he divides longitudinally. Then laying aside the scalpel, he takes the lithotome, whose handle has been previously fastened at the proper degree, and directs the point of it upon the conducting instrument, with its concavity turned upwards, in order to introduce it into the bladder in the same way as when we make use of the instrument of F. Côme. Before opening it, it is to be made to circumscribe a half circle, in order that its concavity, which was turned upwards, may now look downwards towards the rectum. It is then to be opened, after which it is to be withdrawn in the direction of the external wound, after having embraced it with the thumb and forefinger of the left hand a little beyond its handle, while with the right hand we keep it open, in order to divide from within outwards the prostate and the soft parts, which had been respected by the scalpel.

There can be no doubt that the ordinary bistoury might in this operation be made to answer perfectly well in place of the scalpel ; that the lithotome of F. Côme, directed first to the left and afterwards

to the right, may serve to incise the same parts; and that the double cutting-edged gorget, which Physick had already made use of in 1804, which M. A. Cooper also sometimes employs, and which Béclard has proposed, might also be very well adapted to effect this double incision; even the simple strait probe-pointed bistoury might in a case of necessity be substituted for all those instruments for dividing the prostate. But we cannot deny to the double lithotome the advantage of terminating the operation with a single cut, that of effecting a more certain tension of the parts in proportion as it divides them, of giving a greater degree of regularity to the wound, and especially that of making an actual curved instead of a simple V incision, which latter is the only one which can reasonably be expected if we use the bistoury or other lithotomes. Reason immediately suggests to us the important character of this method. Should each blade of the lithotome be separated to the distance only of four lines, there would evidently result from this a wound of at least 8 lines, or even 10 lines, if we include the calibre of the urethra. Now since each oblique posterior portion of the prostate has nearly 10 lines in diameter, it is perceived that we may thus give to the wound as much as 20 lines in dimension. Moreover, if the incision accurately represents a curve, the tractions made upon it in our efforts to straighten it, will elongate it still more; and the posterior portion of the prostate being crowded back with the rectum, while we are endeavoring to extract the stone, will be readily transformed into a second curve parallel to the first, so that a calculus of 20 to 24 lines in thickness, and from 5 to 6 inches in circumference, might, strictly speaking, pass through this opening without causing any laceration. None of the ancient methods of perineal lithotomy can be compared in this respect with the transverse operation. As it incises the tissues to the outside, and slightly backwards, it cannot endanger the intestine, except in cases where this latter is enormously distended on each side of the bas fond of the bladder, and then only when we are obliged to open the lithotome to a very great extent. The pudic artery is also protected from any kind of lesion. The same may be said of the superficial artery in all cases where it occupies its normal position. So also with the transverse artery, which can be but rarely wounded, for the most advanced point of the incision must be behind the bulb of the urethra, to which part it is found to be principally distributed. The only arteries therefore that can be wounded are the posterior branches of this last mentioned vessel, when they are larger than usual near the anus, and the anterior divisions of the hemorrhoidal artery. As the first incision comes down upon the membranous portion of the urethra, and as the two blades of the lithotome are first obliged to act towards the outside, the verumontanum and the ejaculatory ducts are necessarily protected from every kind of danger. Nevertheless, it is not to be forgotten, that in some persons, the lower dilatation of the rectum is prolonged to below the prostate, and that if we should make the incision too near the anus, we might readily perforate this intestine at the first stage of the operation, as it is said happened in one instance to Dupuytren himself. A danger which reason would have enabled us to have apprehended, is that of a urinary fistula. It would seem at first view that so ex-

tensive a wound of the posterior and inferior wall of the urethra, must be little calculated either for immediate or consecutive reunion. Experience, which is the only competent judge in such matters, has not confirmed these apprehensions. On the contrary, it goes to show that as a general rule, the urine resumes its natural course more speedily after the bilateral operation than after any other. They count at the Hotel Dieu as many as 26 patients operated upon by this method, without a single one of them terminating fatally; out of an aggregate of 70 mentioned by Dupuytren, there were but 6 that perished. If, in respect to the accidents, it is not better, it must at least be confessed that it is full as good as the other processes. To derive all the advantages possible from it, the incision, it would appear to me, ought to fall upon the base of the uretro-anal triangle, in such manner as to avoid, at the same time, both the anus and the bulb, and afterwards to arrive at the posterior part of the membranous portion of the urethra, a little in front of the prostate, after having divided through the integuments, the sub-cutaneous layer, the mixed fibres of the sphincter of the anus, the bulbo-cavernous and transverse muscles, as well as those of the aponeuroses at the point where they are blended together. It is necessary also that the horns of the incision should be sufficiently prolonged in the direction towards the ischio-rectal cavities, to prevent their presenting any obstacle to the escape of the discharges externally. If the bilateral operation did not admit of as prompt a cicatrization as the incision on one side only of the prostate, it would without doubt, as Béclard considered it and as Scarpa maintains in his letter to M. Ollivier, constitute nothing more than an exceptional method, useful only in cases where the calculi were exceedingly voluminous; but since the contrary is the fact, I cannot see what should prevent it from being adopted as a general method.

*D. Process of M. Senn.*—M. Senn, a surgeon of Geneva, has endeavored to prove, that in place of performing the transverse operation with the double lithotome, it is better, by means of the straight probe-pointed bistoury, to divide at first only one of the oblique portions of the prostate, and that should the stone seem to be of too large a size, we should then incise this gland transversely to the right, with a second cut. Upon the strength of geometrical data, he asserts that the triangular flap thus circumscribed at the expense of the urethra and the gland through which it passes, and the base of which flap is posterior, and to the right, procures when it is stretched or pushed back towards the rectum, at the time of extracting the calculus, a greater opening than by the process of Dupuytren. The process of M. Senn differs from that which Thomson recommends in cases of large calculi, in this particular, that one of his incisions is to the right, and the other to the left, while the English surgeon made them on the same side, one above and the other below. In my judgment it possesses the inconvenience of being more tedious, and somewhat less certain than the operation by the double concealed lithotome, without having any real advantage over this last. Martineau, of Norwich, had already laid it down as a rule, and Louis himself had also recommended it, that we should, when we experience any difficulty in extracting the stone

introduce the finger into the bottom of the wound, for the purpose of ascertaining the point which makes resistance, and then proceed by means of the bistoury to enlarge the incision either backwards, upwards or outwards, as was practised with so much success by Saucerotte; from whence it follows that there is no portion of the prostate which will not have been incised by either one or the other of the processes, for the lateralized or oblique, or transverse operation, as the same have been modified by Louis, Martineau, Boyer, Thomson, Dupuytren and M. Senn. From this circumstance even, there has originated a new mode of performing lithotomy.

### § V.—*The Quadrilateral Operation.*

The necessity of not going beyond the limits of the prostate while enlarging the entrance of the urethra, and of obtaining, nevertheless, an opening as large as possible, has induced M. A. Vidal, who had, he asserts, made investigations on this subject at the hospital of Marseilles, in the year 1825, to propose that we should incise this gland upon its four principal portions, that is to say, on both sides posteriorly to the left, and posteriorly to the right, and obliquely forwards. According to M. Vidal, this quadruple incision might be made with a single cut, by means of a four-bladed lithotome; but he prefers using a simple bistoury, carried successively in the four directions indicated. The reason for this preference is, that if the calculus is but of little volume, the surgeon may at his pleasure incise only one, two or three portions. His method has been followed at the hospital of Aix, by M. Goyrand, who asserts that he has been well satisfied with it. I have myself had occasion to put it to the test in a patient in whom the calculus had two and a quarter inches in its principal diameter. The patient was a man 69 years of age. I operated at first by the method of F. Côme, and it was not until after having recognized the impossibility of extracting the calculus without lacerating the parts, that I had recourse to the process of M. Vidal, modifying it however in the following manner: In order not to be obliged to let go the stone, an assistant took charge of the hooks in which it was grasped, and held them up slightly elevated towards the left side. A straight probe-pointed bistoury guided upon the forefinger, enabled me to incise the posterior right portion of the prostate, after which I did the same to the transverse portion, at some lines above. The operation was followed with complete success. In adopting this process, each incision may have only two or three lines of extent, and yet their aggregate, nevertheless, will furnish an opening of nearly an inch. If we should give them four to five lines in extent, it is immediately perceived that we shall have a passage of from 15 to 20 lines in diameter, and that under such circumstances we would obtain a track for the largest description of calculi, without running the risk of going beyond the periphery of the prostate, or of wounding the rectum or any of the arteries of the perineum. Should the bilateral operation prove insufficient or create any danger, the suggestion of M. Vidal would then offer us a resource which it would be important not to neglect. Upon the supposition that we should decide at first in its favor, there would, in my opinion, be an

advantage in making use of the four-bladed lithotome which M. Colombat has had made, rather than to make the four incisions in succession with an ordinary bistoury, and this for the same reasons which render the double lithotome preferable in the simple bi-transversal operation. It is important moreover not to forget that M. Vidal incises the prostate in the direction of its oblique portions, and not from before backwards or transversely, as has been erroneously stated.

### § II.—*The Operative Processes in Perineal Lithotomy.*

A. *The different Articles.*—Before commencing the operation the surgeon ought to arrange in order all the articles which may be needed, whatever may be the process upon which he has decided. These articles are: 1st, silver catheters and sounds, or such as are of gum-elastic should they be required; 2d, a common straight and a convex bistoury, the curved bistoury of Pott, a straight probe-pointed bistoury, one or more cutting gorgets, and one of the *lithotome knives* mentioned above, if we have the intention of using them; 3d, the concealed lithotome of F. Côme, opened at number five or seven for children, and at nine or eleven, but rarely thirteen or fifteen for adults; 4th, the stem and the button scoop having a crest on its flat side; 5th, a simple gorget; 6th, straight and curved tenacula of various dimensions; 7th, long polypus forceps, dressing forceps, dissecting forceps, and straight and curved scissors; 8th, the needle having a handle used by J. L. Petit, or that of Deschamps, together with common ligature needles; 9th, a simple canula of metal or gum-elastic, another canula provided with its cover, rolls of lint encircled at their middle portion by a noose of strong and well waxed thread; and 10th, small balls of lint and coarse lint, a few bandages and compresses, lithotomy bands, water, sponges, some styptic liquid, a strong syringe, and finally, one or more wax candles if the natural light does not appear to be sufficient.

I. *Sound.*—Among these articles there are some, the selection of which requires particular attention, viz.: the sound and the tenacula. All other things being equal, the sound should be rather large in size than too small. The more volume it has the better it distends the urethra, the easier is it to feel it at the bottom of the perineum, the more advantageous does it become as a director of the other instruments, and the less danger will the patient have of being wounded. Its groove ought to be at the same time wide and deep; otherwise the finger will have difficulty in distinguishing it through the walls of the urethra, and the lithotome will be unable to be directed by it with a sufficient degree of accuracy. It is a matter of little importance afterwards whether we give its transverse portion the semi-lunar form which it formerly had, the triangular shape which is generally preferred by the English surgeons, or the square shape as recommended by Dupuytren. As the cul de sac which terminates it is but of doubtful utility, and must be calculated to interfere with the movements of the point of the lithotome, it ought to be divested of it, but in a gradual manner, in order to preserve a rounded and blunt arrangement to the sound. Were it prolonged to the extremity

of the instrument it would possess no advantages except in the processes where the sound is to remain fixed, and not to be raised up towards the pubis before the division of the prostate, because in such cases the point of the bistoury is more firmly secured by it. The curvature of this instrument moreover need not extend as far as its extremity, which latter ought to go an inch or two beyond the axis of the handle, if we do not wish to run the risk of its receding into the urethra when we suppose it to be still in the bladder. It is unnecessary to add that the form of its plate is a mere matter of taste, and that in terminating it in this direction with a ring in the manner of Pouteau, or by a stem provided with a wooden handle like that of Lecat, &c., we render it neither more nor less convenient.

II. *Tenacula.*—The ancient tenacula, which were articulated like scissors and very near their branches, possessed the double inconvenience of opening more extensively in the wound than in the bladder, and of grasping the calculus with difficulty. It did not prove sufficient to place the rings on the outer side of the handles; but in order to remedy this defect these last were arranged in such manner that they more or less cross each other inwardly, and that before going past the axis of the instrument outwardly they allowed the branches to open to a considerable extent. Those whose branches remain parallel in the place of separating, while diverging when they are opened, and which are articulated laterally, like those found at M. Charrière's, have moreover the advantage of not losing their grip so readily, and of adapting themselves better to the form of the stone.

III. *Position of the patient and of the assistants.*—An ordinary bed is too large and soft, and in general too low to take the place in private practice of the operating table, used in public establishments. Nevertheless, I am not friendly to those mechanical contrivances that certain persons are so much in the habit of transporting to the chambers of the sick; under this point of view, the table of M. Heurteloup, that of M. Tanchou, M. Rigal, &c., however ingeniously constructed they may be, do not appear to me to be any more indispensable than M. Rouget's bed, or the lithotomy table of the ancients. A *commode*, or an ordinary table, a stump bed firmly fixed and properly prepared, are less repulsive and will always suffice for those surgeons, who do not wish to appear over nice by exacting special contrivances. What is necessary is, that the patient, placed on his back, should have his head and chest in a flexed position, and slightly raised, that the pelvis should not be allowed to sink into the mattress, that the perineum may come beyond the edge of the bed, and that the assistants may have room to place themselves around. We hear no more to-day of seating him doubled up upon the knees of one or two strong men, as at the time of Celsus, nor after he is laid on his back, of lashing him down by means of cords passed under his armpits, and then around the upper part of his thighs, and upon his feet and hands, as was prescribed by the Mnemonists. The straps also of the figure of 8 employed by Le Dran, are no longer found necessary. When it is recollected that no kind of cords has ever been prescribed for the operation of hernia or aneurism, we cannot too clearly perceive what can make it so very urgent for lithotomy, ex-

cept it be in children and in individuals devoid of reason. Hitherto I have dispensed with their use without having any cause to regret it, yet the operation, nevertheless, in one of the patients confided to my care, the one from whom I extracted an enormous stone in the month of October, 1830, at La Pitié, was one of the most severe character. Upon the supposition, however, that we decide upon having recourse to cords, either as a matter of prudence or necessity, we are to have a bandage of woollen, or should that be wanting, one of pliant linen, three fingers' breadth in width, and two or three yards long. With this bandage, which is to be doubled in the direction of its noose, we make a running knot, which is to be applied and fastened on the wrist of the patient, and which is then immediately to include his heel, while leaving the thumb on the fibular side, the fingers below and the radial border of the hand in front. The two heads of the bands are then seized by the surgeon, who separates them and passes them, one inwards and the other outwards, then crosses them upon the instep, and carries them to the plantar surface of the foot, brings them back above, and then behind, and finally in front, at which place he fastens them by a bow-knot, taking care to leave its free extremity to the outside. The foot and the hand on each side thus tied, are confided to two assistants, who are placed one on the left and the other to the right, outside of the limb, while their backs are slightly turned towards the head of the bed, which assistants would have the same duties to perform if we did not make use of bands.

While with the hand which looks towards the pelvis, each of them grasps the corresponding knee, as if for the purpose of separating it from the axis of the body, he makes use of the other hand, while turning it in pronation, to embrace the foot on its inner border and dorsum; if he had placed his hand underneath, the patient might find in this a point d'appui, which he might use in trying to raise up his pelvis, which ought to be particularly avoided. This disposition to raise up the pelvis, which is observed especially in infants, and combined with a movement to the right and to the left, or of rotation, is so difficult to control, that it requires the intervention of a third assistant, who should be stout and strong, and place himself on the left. In applying the palm of the hands on each corresponding iliac crest, with the thumb extended upon the front part of the antero-superior spinous process down to the fold of the groin, he regulates these movements by the simple effect of pressure, and is not in general but very little fatigued. A fourth aid, seated upon the table or bed, watches the movements of the head, and keeps the eyes of the patient covered with a compress. A fifth is placed upon the right and opposite to the side, to keep in the sound and raise up the scrotum. Finally, to the sixth is assigned the duty of handing to the surgeon all the different objects which he may have occasion for during the course of the operation.

*IV. Introduction and adjustment of the sound.*—Before proceeding to the division of the tissues, the operator introduces the sound into the bladder, where he does not fix it until after having again recognized the presence of the calculus, and corroborated the fact by some of his assistants. It has been for a long time adopted as a rule,

to incline the plate of the sound towards the right groin, in order that its convexity may press the perineum more or less to the left of the median line, and obliquely backwards towards the ischium; but it is doubtful if this rule has any great value or any thing else to support it than long usage, or at least, when our intention is to open the prostate with the gorget or concealed lithotome. This inclination in fact does not change the direction of the walls of the urethra in its relations with the axis of the canal. Of what importance is it after all, whether we open the urethra upon the side or upon the median line, so long as we have nothing to do but with its membranous portion, or the making a passage for the other instruments? The only argument that may be adduced in favor of a practice of this kind, is the greater facility, perhaps, by which we may thereby avoid the bulb, by crowding back to the left the urethral portion which this dilatation conceals, and by thereby removing this impediment to the subsequent steps of the operation. It is therefore a matter almost of indifference, whether we place the sound to the left as is generally done, or on the median line as Scarpa and A. Cooper prefer to do, even though we are performing the lateralized operation. Almost all surgeons of the present time, in place of holding the sound themselves with the left hand, with the view of following its movements better or more advantageously varying its position, according to circumstances, as is the practice of various operators after the advice of Pouteau, hand it, as soon as its location is clearly decided upon, to the care of an intelligent assistant, who ought to be well acquainted with its character and uses.

B. *Operation.*—I. *Incision.*—The surgeon with a bistoury which he has selected and holds in his right hand, stands up, or if his stature in respect to the position of the patient appears to require it, rests his right knee on the floor without the necessity of a stool or bench to support him, and then divides first the integuments, which he stretches with the thumb and fingers of his other hand, without paying any attention to the scrotum, which the assistant charged with the care of the sound, gently raises up with his right hand. This incision should commence on the left side of the raphé, at about an inch in front of the anus, and should be carried obliquely backwards, terminating nearly at the middle of the space which separates the tuberosity of the ischium from the opening of the rectum, and should be from three to four inches long. If it were nearer the scrotum it would expose to the danger of infiltration, and could have no object. Its prolongation towards the sacro-sciatic ligament is useless. If it were too short it would interfere with the extraction of the stone, and would not give sufficient facility to the flow of the urine. If it were nearer the median line, it would frequently fall upon the rectum; and if, after the manner of Roux, it should be made very near the ischio-pubic branch, it could not preserve its parallelism with the incision of the deep-seated parts. The bistoury being now re-applied into the upper angle of the wound, is then to divide the sub-cutaneous layer, the posterior border of the transverse muscle, and in succession all the other layers which separate the skin from the urethra, with this precaution, that it should rest much more upon the median portion, than upon the two extremities of the solution of

continuity. Rather than continue this manipulation until we come down upon the directing instrument thus laid bare, it is better at this time to seek through the tissues which have not yet been divided, the groove of the sound by means of the left forefinger, and to place the right edge of this groove between the nail and the pulp of the finger, the radial border of which finger should be turned downwards. The surgeon, without stopping, glides the point of the bistoury, which is held like a pen, upon the nail which remains fixed, then pierces the lower wall of the urethra a little in front of the apex of the prostate, and now arrives into the groove of the sound. The guiding finger is then immediately brought round upon the back of the bistoury, the point of which latter the operator pushes towards the gland, to the extent of three or four lines, while with the other hand he raises up its handle and continues to press the point against the groove in which it is lodged. If it should escape from it, we should be exposed to the risk of perforating the rectum. Ureto-cutaneous fistulas have been produced in this manner; one instance of which I have seen, while another has been mentioned by Dupuytren and M. Bégin. The forefinger resumes its fixed position on the edge of the sound, after which the right hand withdraws the knife, at the same time that it presses its heel by a vibratory movement, in order in this manner to enlarge the opening through the tissues that are in the nearest proximity to the urethra.

II. *The moment of introducing the lithotome*, whatever may be the description selected, is now arrived. If it should be that of F. Côme, the operator seizes it by the handle, and without touching its movable piece, glides its beak upon the nail in the urethral opening, in such manner as to fall perpendicularly upon the groove of the director, and makes with it a few movements backwards and forwards, in order to satisfy himself that it has been properly introduced. When he has positively recognized the metallic contact of the two instruments, he raises himself up if he has been resting on his knees; disengages his forefinger from the wound; seizes hold of the sound and depresses its plate; and gives it a vibratory movement with his left hand, while with his right he glides the point of the lithotome along its groove into the bladder, when the escape of a small quantity of urine soon shows him that it has entered into the organ.

III. The employment of the *gorget* exacts the same precautions. Prudence does not permit us to proceed in a less methodical manner when we give the preference to the tongue or probe-pointed bistoury, or to the small knives with fixed handles, whether straight or convex. If the vesical extremity of the sound had not been pushed back towards the symphysis pubis to give room to these instruments, they would not, it is true, therefore divide the prostate, but their point or their cutting edge would almost unavoidably come in contact with the trigonus vesicalis, or frequently cut entirely through it. In following, on the contrary, its groove, at the time of making this elevation, they place the point of the instrument in relation with the vertical axis of the bladder, and penetrate without danger to such depths as may be desired, and in such manner that we may, while withdrawing them, give to the incision all the extent required.

IV. *The object of the sound having been effected, it is to be withdrawn.* The hand which holds the handle of the lithotome places some of its fingers below its movable piece and opens it ; the other hand is placed upon its back on a line with the articulation of the sheath with its blade, the thumb being upon the right side, the forefinger semiflexed upon the left side, with its radial border turned towards the pubis. Its cutting edge being inclined in the direction of the exterior wound, or in any other manner, should it be preferred, there is nothing more for the two hands to do than to withdraw the instrument by their combined efforts. The office of the left hand is to see that its sheath, while the instrument is being withdrawn, does not become separated from the point on the pubic arcade, against which its concave or dorsal border had been first made to rest. The right hand, which is charged with the duty of withdrawing it to the outside, has to guard against two difficulties. If the wrist were raised up too much, it would give greater depth to the incision at the base than at the apex of the prostate ; too great a depression would produce a contrary effect, and moreover would expose to the danger of wounding the rectum. If it was not made to rest against the osseous arcade, it would have no fixed point, and the dimensions of the wound would vary according as its blade should be directed with a greater or less degree of force downwards ; this is one of the inconveniences of the gorget and of bistouries.

V. Moreover, whatever may be the instrument by which the *debridement* is effected, we would find no other advantage in avoiding, as Moreau recommended, the layers situated immediately underneath the prostate, than that of respecting the rectum with greater certainty, for it is not at this point that we find the transverse artery of the perineum ; but a dangerous difficulty would result from it for the passage of the urine. As on the other hand the intestine is sufficiently protected by the obliquity of the incision, it behooves us not to follow this practice. The more the axis of the wound approaches to a perpendicular position, that is to say, to the axis of the body, the more chances there are against infiltrations and abscesses. In conclusion, as the deep incision has for its object the enlargement of the entrance of the urethra to as great an extent as possible, without going beyond the contour of the prostate, it ought to be made upon the largest diameter of this gland, not only from the centre to the circumference, but also from before backwards, and in such manner that the circle of its base alone shall be respected. Here lies the problem to be solved in the lateralized operation. Now the slightest reflection shows that to effect this object, the division of the urethra in its membranous portion is attended with no advantage ; and that all that is necessary is to open this passage posteriorly, quite near the apex of the prostate, and consequently near the horizontal aponeurosis of the perineum. We see, for the same reason, that it is wholly useless to prolong the incision of the other tissues forward in the direction of the pubes, since its only object is to form a sufficiently large passage for the calculus, and that in respect to the consequences of the operation or the effusion of urine, the posterior direction especially is the one in which the incision should be enlarged.

VI. *The lithotome being now no longer required, is handed*

back to the assistant, and in its place is immediately substituted the left forefinger, which in order to enter into the bladder must be introduced from below upwards, and from behind forwards, and by which we ascertain: 1st, the interior condition of the organ; 2d, the position, and sometimes the size, form, and even the number of stones contained in it; and 3d, the dimensions of the wound. Precautions should be taken to prevent it, while penetrating, from lacerating either the intestine or prostate, by blundering between the rectum and this gland. Before withdrawing it, we introduce upon it the probe-pointed bistoury, to enlarge the incision either of the prostate or perineum, or in this or that direction, should it be found too narrow. The finger may be then used as a director for the bouton, or for the gorget, or even for the tenacula. It is better, in order to carry out this indication, to place the finger in the lower angle of the wound, with the nail turned backwards, than to place it above, and for this reason, because the instruments which it is intended to guide have more tendency to escape between the tissues posteriorly than in front. The bouton being longer, and of less size than the gorget, passes with greater facility around the entire vesical cavity, and comes down better upon the stone, whatever may be its position, but it is afterwards attended with a little more inconvenience as a conductor of the tenacula. We may moreover dispense with either in a great number of cases, and introduce the tenacula immediately upon the finger. As soon as they have performed their exploring duties, they are to take the place of the finger in such manner as to be enabled to depress by this means the posterior angle of the wound.

VII. The operator with his right hand now become free, presents the tenacula above, one of the branches to the right, and the other to the left, and gliding them into the gorget, or embracing the crest of the bouton at their edge which is opened, he pushes them in the same manner as he had done with the finger, and in this manner penetrates into the bladder, at the same time that he disengages the conducting instrument from them. Before thinking of grasping the calculus, he again endeavors to touch it by various movements of the instrument. This being done, we have now finally arrived to the last stage of the operation, which is frequently the longest, sometimes the most difficult, but usually the most simple and rapid. The surgeon then opens the tenacula by making traction upon each of the rings, by means of the thumb and forefinger of the corresponding hand. When their branches are sufficiently separated apart, he makes a sudden movement with the instrument from right to left, to the extent of a quarter of a circle upon its axis, in such manner that one of its scoops is immediately placed below and the other above, and that the branch below grazes, so to speak, the vesical wall, and may glide underneath the calculus. If this first movement does not succeed, it is to be repeated, either in the same direction, or from left to right, or by elevating or depressing the wrist still more.

VIII. The stone being once seized, may widen the handles of the tenacula to a greater extent than had been supposed, which arises from its being too near the joint of the instrument, from its not having been embraced by its smallest diameter, or from our having been deceived in respect to its volume. It is an inconvenience which may

be remedied in the two first cases, by pushing back the calculus before the tenacula by means of a sound, without entirely relaxing our hold upon it, or by making such movement upon it, that it may present itself at its smallest diameter. In the third case, there is no other resource than to enlarge the prostatic opening, should it not appear to be of sufficient dimensions. In conclusion, it is better to let it fall out and to seize it again, than to persist in attempting to change its position between the branches which retain it; it being well understood that if it is not very large, all these precautions are in general unnecessary. If the stone should be flattish, and much longer in one direction than in another, it might, though seized by its smallest diameter, be necessary to relax our hold upon it, and then to grasp it again, should it have become placed transversely in the wound. The same would be the case with any elongated stone whatever, or with the cylindrical or cucumber shaped calculus, &c. These peculiarities are indicated by the resistance which is suddenly perceived at the moment when the tenacula are upon the point of being entirely withdrawn from the bladder. Even without being opened, they may, from their leaving between their branches a certain space, which prevents them from compressing the organ, have got the calculus lodged and confined between them, should it be small and flat, and this without the operator being aware of it. We may, however, presume this to be the case, when, after having touched it, and endeavored to grasp it, we can feel it no more. In a case of this kind, we withdraw the tenacula, in order to be certain of the fact. Moreover, it not unfrequently happens that small calculi make their escape with the flow of urine, or become arrested in the track of the wound, and thus for a moment give rise to doubts as to their existence. I will now suppose that the stone has been finally seized. The tenacula being now replaced horizontally, the surgeon seizes their rings with his right hand, and fixes them as near as possible to the branches, by means of his left hand, turned in supination, with the thumb above and the fingers below. He then commences the tractions, after having thoroughly convinced himself that the stone is free, and the only thing embraced. For that purpose he confines himself to making pressure on the tenacula from above downwards, with the thumb of one hand, in order that the instrument may rest chiefly against the posterior angle of the wound, while the other hand makes such efforts as are suitable. These movements are made to the right and left, and above and downwards, rather than in a direct line. We take care, however, to make them follow the axis of the pelvis in the same way as for extracting the head of the infant by means of the forceps.

IX. Should the *straight forceps* constantly pass above the stone, without being enabled to embrace it with its scoops, or, in fine, should the stone have escaped from it in consequence of being turned aside, or too much depressed in its position, or from being situated in too deep a cavity, the curved tenacula would then be indicated. Being introduced like the others, they should have their concavity turned in the direction in which the calculus is situated, in order to seize it, and in order to extract it, be brought out in an opposite direction. The *forceps tenacula*, contrived by F. Côme, can scarcely be necessary except for large sized stones completely embraced by the

bladder, being of that class of calculi which Ammonius (Dujardin, *Hist. de la Chir.*, p. 340,) recommended should be first broken up, in order afterwards to extract their fragments with facility. The branches of these *forceps tenacula* are to be placed in succession by making them glide gently between the walls of the organ and the foreign body : we then lock them together in the same manner, precisely, as when we are manipulating with the obstetrical forceps.

X. *After the calculus has been extracted*, we are to examine its appearance. If it is rounded off and of an elliptical, oval, or elongated form, but destitute of angles or facets, we are justified in supposing that there are no others in the bladder. Calculi which are covered with asperities would lead to the same conclusion, while those which present facets indicate the contrary. This examination, however, which can give nothing but probabilities, does not allow us to dispense with further researches. The finger or the bouton, therefore, is to be reintroduced into the cavity of the organ, in order to ascertain positively what we have to depend upon. Some bladders moreover contain a considerable number of calculi. The bladder in a person who had been operated upon three times was found still to contain 300 calculi when the autopsy was made by M. Ribes. The journals have spoken of a patient in whom M. Roux extracted near 100 ; while Murat, (*Arch. Gén. de Méd.*, t. VIII., p. 131,) in another patient, counted 678. M. Souberbielle has shown me sixty-six that he extracted from a bladder after the operation for lithotomy. I found 160 of them in a patient, in 1836. It is important that none of these calculi should remain in the bladder, or even in the track of the wound. As they are ordinarily small, many of them may become easily lost in the midst of the tissues.

XI. *The volume of the calculus* may also become a source of embarrassment. If they exceed two inches in their smallest diameter, it is frequently impossible to extract them even by the recto-vesical operation. It was in a case of this kind that Dupuytren laid open the anterior wall of the intestine, after having performed the bilateral taille. Various instruments have been proposed, under such circumstances, to break and reduce them into fragments. That of F. Côme has two pyramidal teeth on the interior of the branches, which are filed down flat. The stone-breaking tenacula of B. Bell are also provided with teeth, and a quick screw going through their handles. The forceps contrived by M. Sirhenry to break up the calculi by penetrating through the urethra, the virgule forceps of M. Heurteloup, the friction forceps of M. Rigaud, the jointed noose of M. Jacobson, and almost all the lithotritic forceps might also effect the same purpose. These last mentioned instruments would also have the advantage of enabling us to perforate the calculus, should their ordinary construction not be found sufficient to break it, and they ought therefore, in my opinion, to be preferred ; but the stones which render such manipulations indispensable are so voluminous and difficult to embrace, that we generally prefer having recourse immediately to the hypogastric operation, and thus to extract them above the pubes. M. Mattuizzi, (*Bull. de Fer.*, t. X., p. 277,) in a patient who afterwards recovered, was enabled to extract a stone of eighteen ounces through the perineum. A debridement of two lines, performed on

the fifth day, enabled M. Alaman (*Bull. de Therap.*, t. XIII., p. 169,) to extract a calculus of the weight of six ounces, and which, after having resisted his efforts, had become spontaneously lodged in the wound.

XII. No person at the present day is alarmed to so great a degree at finding the calculus, when it is very friable, *crushed* between the branches of the forceps, as to think of employing the quadruple forceps of Bromfield, the graduated tenacula of Lecat, the *filet-en crin* of Has, the forceps of Home with a circular development, or the triple tenacula with eyed branches, as made by the cutler Cluby of Sheffield. Should this accident happen, it is found to be more convenient to seek in succession for all the fragments by means of the same forceps, and to extract their particles by means of emollient injections. I have, however, operated successfully on a patient who suffered a great deal from this accident. The stone, which was broken up into an infinity of angular fragments, and which, moreover, had the appearance of a mural calculus, had become glued in fragments to the walls of the bladder, like patches of concrete mortar upon wet rumpled linen, so that it became necessary, so to speak, to scrape its interior with the scoop and finger in order to extract them.

XIII. *The fixed condition of the calculus* has given much more embarrassment to operators. Before wasting our time in useless efforts we endeavor to recognize with the forefinger what is the nature of the difficulties which present themselves. If the foreign body appears to adhere only upon one of its sides, it is probable that fungosities or vegetations have become introduced or grown up between its bosselures. In this case the process of Lapeyronie, as employed by Maréchal, Le Dran and Boyer, and which consists in making methodical traction on the stone as soon as it is grasped, in order to tear it out, is the only one which is applicable in all those instances in which we have not been enabled to detach it by jogging it with the finger, scoop or bouton. If it should be encysted and adherent at the same time, the breaking down the cyst with a grooved sound, as recommended by Littré, would amount almost to nothing. We should scarcely succeed any better by mashing it with the branches of the tenacula, as is also recommended by the same author; the tearing of it out then also is the only remedy. When it is merely arrested by a bridle or retained in an open cyst, but without any adhesion, the cutting instrument will not always be unattended with advantage. Garengeot, Leblanc and Desault had recourse to it with success. A probe-pointed bistoury should be cautiously directed upon the free border of the cyst, and then inserted flatwise between its inner surface and the calculus, in such manner that in bringing its cutting edge outwards it may incise the accidental pouch to a convenient extent from its summit to its base, in the same way nearly as would be done in a hernial debridement. Nothing would prevent our repeating this incision on other points of the bridle, if the first should prove insufficient, or should it have appeared to have been attended with too much danger to carry it to the distance desired. The tonsil kyotome or bridle cutter used by Desault, is certainly not as good as the bistoury of Pott, and ought not to be adopted. The ordinary straight bistoury used by Garengeot has two disadvantages: 1st, its point is constantly in danger of wounding the

walls of the bladder; 2d, it neither glides nor is introduced with as much facility as the probe-pointed bistoury between the cyst and the surface of the stone. The surgeon however ought not to forget that the bridles formed by a mere partial contraction of the bladder, and the abnormal sacs developed external to this organ in place of projecting into its interior, would not allow us to make incisions of this kind, except with extreme caution, since from their acting in such cases on the walls of the bladder itself, they would rarely fail to wound the peritoneum. There would however be an exception to be made in favor of calculi fixed in the urethra by one of their extremities. As the orifice of this canal traverses very obliquely the tissues of the bas fond of the bladder, it might, in fact, be incised separately to the extent of several lines without any danger. Finally, if the calculus was in the form of a gourd, for example, and was arrested by one of its portions, either in the urethra or an accessory pouch of the bladder, we should have to resort again to various movements and tractions, and not attempt incisions except as a desperate remedy.

XIV. *The foreign bodies*, which are sometimes designedly introduced into the urethra, such as sounds, bougies, &c., sometimes escape either as fragments or entire into the bladder. Their extraction should then be effected as soon as possible. M. Ferrier, (*Rép. d'Anat. et de Phys.*, t. IV.,) by having fixed the lower end of the piece of a sound against the arc of the pubes by making compression upon the perineum, was enabled to extract by means of a turrel; and M. Tyrell reached one in the bladder and ultimately extracted it by means of the forceps of Weiss, (*Encycl. des Sc. Méd.*, 1836, p. 241.) In a similar case M. Haime (*Prec. Méd. d'Indre et Loire*, 1820, 1st trim.) also succeeded without recurring to a bloody operation. Duse and M. Ségalas have extracted them by means of the litholabe with two branches. But it quite frequently happens that we are obliged, under such circumstances, to have recourse to the operation. A patient of M. Roux, (Dubourg, *Journ. Hebdom.*, t. IV., p. 11; Andral, *Thèse*, No. 293, Paris, 1837,) who was operated upon in this manner for a sound which had escaped into the bladder the day before, died on the seventh day. Those of MM. Vignerie (*Journ. Hebdom.*, 1834, t. I., p. 183) and Mouliniè, (*Bull. Méd. de Bord.*, 1833, p. 41,) on the contrary, were perfectly restored. Dupuytren, it is stated, has performed the operation five times, and Béclard (*Bull. de Therap.*, t. I., 1832) once for this description of accidents. Certain is it that a great number of practitioners, with Lesage, M. Duval, (*Bull. de la Fac. de Méd.*, t. VI., p. 420,) &c., have made mention of sounds that have become broken off in the urethra or escaped into the bladder. Supposing then that the foreign body could not be seized in the urethra by means of the processes mentioned in the paragraph on calculi, nor in the bladder by means of the forceps already described, it would then be necessary to have recourse to cystotomy. In such cases the perineal operation, which is the most simple, would evidently be found sufficient, since it is unnecessary to make a large incision into the parts. The finger, a blunt hook, or a polypus, urethral or lithotrity forceps would then be found sufficient to remove the sound or the broken portion of it in the bladder.

XV. *The operation in two stages.*—The difficulties attending the grasping or extracting of the stone, and the danger of occasioning too much suffering to the patient, by tedious explorations, have suggested the idea of performing lithotomy in two stages, that is to say, to confine ourselves at first to the opening of the bladder, and to defer to another period the extraction of the calculus. The Arabs had already entertained the same idea, for Albucasis says, that if a hemorrhage should supervene, the surgeon ought to dress the wound with vitriol, and then wait. Franco, who revived this practice, waited from three to five days. Maret de Dijon, however, is the first person who endeavored to generalize it. This principle has also been supported by Kamper and by T. Haaf, which last did not undertake to search for the stone until at the expiration of 8 days, and more recently by Guérin, of Bordeaux. No doubt that in adopting it, it has been hoped that the foreign body would of itself have escaped through the wound, or come out upon the dressing, or at least approximate the passage which had been made for it, and be no longer attended with so much difficulty in reaching it. But in opposition to these advantages, we have the restlessness of the patient, the irritation which the presence of the calculus constantly causes, and the acute pains which are necessarily produced by the tenacula in passing through a wound; in a word, we have two operations instead of one. Modern practitioners, therefore, have rejected this modification of the operation, and do not come to the alternative of leaving the stone in the bladder, when they have made the division of the soft parts, except it be impossible to act otherwise. As to a transverse incision, as Paul and Avicenna (*Thèses de Haller*, t. II., Fr. trans.,) recommend, or to the right rather than to the left, as is advised by Tarin, (*Ibid.*,) in the lateralized operation, these are precepts which at the present day are lost sight of in the methods established.

XVI. *Injections.*—From the apprehension that particles of gravel may be left behind in the bladder, most operators are in the habit of washing it out freely, by means of injections of tepid water or emollient decoctions. If these injections are methodically made, they can never do any injury. As they have the advantage of cleansing out the clots of blood and the flocculi of mucus, as well as the fragments of calculi, which frequently escape the most minute exploration, we do not see how they could be dispensed with. In order to make use of them we should be provided with a large, or injection syringe, which would contain a litre of liquid. Without this precaution the amount of contained fluid would not possess sufficient force to drive out the matters that we wish to expel. In order not to wound the organ we may make use of a syphon, which terminates in the manner of the spout of a watering-pot, and is made either of tin or gum-elastic. With a little address, however, and in tractable subjects, the simple syphon does not expose to any risk. After the first injection we usually make use of a second, and even of a third, in order to be sure of detaching all the foreign substances. The patient is then to be immediately cleansed with a sponge and tepid water; after which we unloose the cords, or other confining means which the operation had rendered necessary. We then place him on his back in bed, with the head and chest slightly elevated,

and with his lower limbs brought together and semiflexed, and supported by a sheet, rolled in the form of a cylinder, or by a transverse bandage passed under his hams. It is unnecessary to tie his legs or thighs, as was still done in the last century, in order to prevent them from being separated apart. Nor is it necessary to keep him permanently even in a dorsal position. It is necessary that the patient should incline to one side or the other, and that he should not confine himself to his first position only to the degree that it does not become too fatiguing for him.

XVII. *Canula in the wound.*—For a long time since, the sound has no longer been left in the urethra to re-establish the course of the urine. The same nearly may be said of the canula, which a considerable number of operators considered it proper to leave in the wound a certain number of days after the operation, and which was intended to prevent infiltrations by conducting all the effused liquids outwardly. This canula, which was disapproved of by Schmucker, (*Bibliot. Chir. du Nord*, t. I., p. 39.) but which some practitioners, and M. J. Cloquet in particular, still make use of, irritates the wound and neck of the bladder, and even the interior of this organ. It becomes a foreign body, which interferes with the salutary efforts of nature, fatigues the patient to a greater or less degree, and of itself alone may give rise to serious accidents. I have seen it used in an old man 84 years of age, who was soon seized with adynamic symptoms, and died at the expiration of 11 days. The whole extent of wound was covered with a grayish colored concretion; pus had become infiltrated into the neighborhood, and traces of purulent inflammation had extended even into the interior of the pelvis. Should it ever be deemed necessary to present any obstacle to the approximation of the lips of the wound, it would be better to place in it a meche of ravelled linen, or a simple tent of lint, than a canula.

### § VII.—*Accidents of Perineal Lithotomy.*

It is perceived that the perineal operation must be one of a painful and serious character. Instances however are cited, in which the patients have performed it upon themselves. The blacksmith mentioned by Tulpius. (Bonet, *Corps de Méd.*, t. III. and t. IV., p. 42,) and the physician Clevel (*Bull. de Fér.*, t. III., p. 59) must have been examples of this kind. *The truth may not resemble the truth!* Perhaps also in these cases the calculi had come out of the bladder and projected at the perineum.

A. The first accident which we have to fear in the lateralized operation, and in perineal lithotomy in general, is *hemorrhage*, which may show itself in three different ways: at the time itself of making the incision into the tissues, in the course of the first twenty-four hours which succeed to the operation, or only after the expiration of a certain number of days. In the first case, it may depend, as I imagine, upon a lesion of the superficial artery, of the transverse artery of the perineum, of the hemorrhoidal, or of the trunk of the pubic, of the prostatic venous plexus, or as I presume of some anomalous artery, like that which passed through the prostate in the patient mentioned by Shaw, (*Bull. de Fér.*, t. VII., p. 269.) The hemorrhage comes

from the superficial branches, if the blood escapes from the upper angle of the wound, or from the sub-cutaneous layer; and from the transverse artery, on the contrary, when the finger introduced at a certain depth, arrests it by making pressure on the external lip of the wound opposite the bulb and the membranous portion of the urethra. The hemorrhoidal will be the source of it, if the blood escapes by the lower angle of the wound. The hemorrhage will also be found posteriorly and to the outside, but at a great depth, in those cases in which the pudic artery itself shall have been wounded. The hemorrhage which arises from a division of the veins, or which is caused by the section of an artery situated around the prostate, will, from having its source at a greater depth than any other, be distinguished from the preceding by the color of the blood in the first case, and in the second case by the fact that the pressure made by the finger on all the points of the perineal wound will be found insufficient to suspend the flow of blood even momentarily. So long as the flow of blood does not take place per saltum, and that it does not flow in such considerable quantity as to occasion much debility in the patient, we need not make any effort to arrest it. In many cases it is a salutary bleeding, which may prevent a number of serious accidents. If, on the contrary, it threatens to be abundant, and to continue, and if the patient is enfeebled or at an advanced age, it is advisable to check it as soon as possible.

The most efficacious, and at the same time most simple means, is the ligature, when it shall be found practicable. When the divided artery can be seen in the interior of the wound, it is to be seized with a dissecting forceps, or if it is not sufficiently isolated, by means of a tenaculum, after which we immediately pass the ligature around it. If the artery in question should be the pudic, and its extremity could not be seized without too much difficulty, we should, I conceive, imitate Physick, who wounded it in his first operation for lithotomy, and pass between it and the ischio-pubic ramus a double thread, by means of J. L. Petit's curved needle with a handle. This needle would be introduced through the interior of the wound, and pass on the outer side of the artery behind its division, in order to re-enter into the solution of continuity, where the thread would be disengaged from its point in order to enable us to withdraw the needle, and the ligature then knotted intermediately on the tissues. I do not think in such cases, that we should ever think of passing a ligature through the obturator foramen in order to encircle the ischio-pubic ramus at the same time with the artery, as is recommended by M. Caignon, (*Arch. Gén. de Méd.*, t. IX., p. 137,) nor that we should apply a ligature upon the vessel at the point where it passes through the sciatic ligaments, as is advised by M. Travers. This wound, moreover, is so rare, and one which it would be so difficult to make, unless we deviate from all the rules of sound surgery, that the means proposed to meet its dangers cannot possess any great degree of value. It is probable, moreover, that a deception has in more than one instance arisen in this matter, from the hemorrhage being caused by abnormal branches, or by secondary ramifications that are somewhat more largely developed than usual. Upon the supposition that the artery could be seized and isolated with sufficient ease,

but that it was too high up to surround it with a ligature without being attended with considerable difficulty, we should not hesitate to make torsion upon it by means of the forceps with which we had seized it. Finally, if neither torsion nor the ligature are practicable, and it should become necessary at every hazard to put a stop to the hemorrhage, there are various other means that may be made trial of. The solid sound, arranged in such manner as to fill up and press against the whole extent of the wound, as was still practised not more than half a century since, had the inconvenience of making stronger compression towards the skin than towards the prostate, and of frequently forcing the fluids to be effused into the bladder. Boyer, like Richerand, (*Mém. de la Soc. Méd. d'Emulat.*, t. IV., p. 275,) appears to have frequently made use with advantage of a roll of lint introduced as far as into the bladder, and secured by means of a ligature whose two heads were afterwards knotted at the outside, upon another roll, which was inserted as deep as possible in the direction towards the urethra; but the little apparatus of Dupuytren evidently deserves here the preference over all the others. It consists of a canula opened on its summit and sides, around which there is attached a piece of fine linen in the form of a sac. It is introduced to beyond the neck of the bladder, after which we glide between it and the linen, by means of a dressing forceps, a quantity of soft lint, until the wound is completely filled up with it, and in such manner that it makes a suitable degree of pressure upon its entire circumference, and with a little more force near the bottom than towards the skin. The whole being fastened by means of a T bandage, presents no impediment to the flow of urine, and moreover allows of our increasing or diminishing the pressure in this or that direction, as may seem advisable. After the lapse of two or three days, the surgeon gradually withdraws the small balls of lint, and soon after removes the remainder of the dressing.

If the hemorrhage does not make its appearance until after the expiration of the first few hours, it is rarely sufficiently alarming to render the interposition of instruments necessary. It is not because the contact of the air had temporarily contracted the vessels, nor from a supposed spasm of their calibres, that the blood, which now appears, did not show itself at the time of the operation, but because the general circulation, which is usually very gentle when the patient is on the bed of sickness, soon undergoes a strong reaction and an increased augmentation of power in its propulsive energies; from whence it follows that the disease then quite frequently becomes its own appropriate remedy, and that these kinds of hemorrhages may be suspended under the influence of cold applications or by revulsive means, which have the tendency to repel the fluids into another direction. Thus we should commence in such cases by applying cold water over the hypogastrium, upon the upper part of the thighs and to the perineum, and by injection even into the wound; should there be fever and hardness of pulse, a small bleeding by the arm would evidently be indicated. In the contrary cases, mustard manuluvia, dry cupping followed by scarifications between the shoulders, and cataplasms of mustard to the same regions, should be made trial of before proceeding to look for the wounded vessels or to having recourse to tamponing, unless the hemorrhage should be extremely

copious. When it does not show itself until after the first days, it is almost certain that it does not depend upon a mere wound of an artery, but that it is occasioned by a pure exhalation either from the wound or from the cavity of the bladder. To admit the contrary, we should have to suppose that there had been an eschar, which had become afterwards detached from the walls of the vessel; or that there was, as in fact we sometimes find to be the case, a general state of exhaustion, and a marked dissolution in the fluids, which has brought about the fusion of the sanguineous clots, and all other deposits which had been interposed against the escape of the blood. We thus perceive that this must be of the most dangerous kind. It does not, however, exact a different kind of treatment from the other. A patient who had been operated upon by the perineal process, by Dussaussoy, (*Soc. de Santé de Lyon*, 1798, p. 145,) was seized an hour afterwards with a considerable degree of hemorrhage from the interior of the bladder. A similar accident took place at the expiration of several days, in a patient operated upon by Guérin, (*Ibid.*, p. 158.) On forcibly introducing the finger through the wound, the bladder was found to be filled with clots. Injections and frictions put a stop to the sanguineous exhalation, and both patients recovered.

B. *Spasm of the bladder.*—An accident, which up to the present time has scarcely been noticed, viz., spasm of the bladder, existing to such degree as to present difficulties in the extraction of the calculi, appears to have been frequently met with in children, especially by M. Riberi, (*Journ. des Conn. Méd.-Chir.*, 1838, p. 164,) who treats of it by means of tepid water thrown up freely into the wound with a large syringe.

C. *Wounds of the intestine.*—If, as I have seen in one instance, the rectum is wounded in the first stage of the operation, or in any manner whatever, before the bistoury has reached the neck of the bladder, the wound will be found to be underneath the prostate. As this accident most usually happens while we are withdrawing the lithotome, the perforation is then made on a point more elevated and above the sphincters, even though we should make use of the plate contrived by M. Caignon (*Arch. Gén. de Méd.* t. IX.,) to crowd back the prostate. The making traction upon the penis while we are incising the prostate, as recommended by M. Huguier, (*Thèse*, Paris, 1834,) would scarcely be attended with any greater advantage. In quite a considerable number of cases, we are not at first aware of the accident. It may even happen that there has not been a complete perforation, but that the wall of the rectum, already greatly attenuated by the cutting instrument, has been contused and mortified during the extraction of the stone, and that the fall of the eschar is alone chargeable with the production of the accident. It was in this way that the accidents appeared to have taken place in a patient whom I saw at the Hospital of St. Louis, in 1822. In the first case, that is to say, where we immediately recognize, either by the gases or the passage of faecal matters or urine, that the rectum has been wounded, if the division has been so extensive that we have reason to apprehend that it may be transformed into a fistula, the most certain means of preventing this termination consists in laying open completely the extremity of the perineum and intestine as far as to the anus. As the con-

traction of the sphincters do not now present any obstacle to the free passage of the matters, the wound will in general cicatrize with the same rapidity as if nothing particular had happened. In the second case, that is to say, when some days have elapsed, whether there may or may not have been loss of substance, the recto-vesical fistula is already established, and inasmuch as instances are known in which they have disappeared spontaneously, we ought to wait for the ordinary term of the cure, and afterwards treat it in the same way as we would a fistula which might result from any other cause.

D. Though *urethral fistulas*, properly so called, are quite rare at the present day, they are still, nevertheless, sometimes noticed; but whether they communicate directly to the exterior, or only reach there through the medium of the anus, their treatment being the same as that of urinary fistulas in general, will be considered in another article.

E. *Paralysis* of the bladder, and retention of urine, which are sometimes caused by clots of blood, and also the tumefaction of the wound and inflammation of the neck of the bladder or prostate, with syncopes, convulsions, incontinence of urine, and inflammations of every description, which may manifest themselves during, or a short time after, the operation for lithotomy, do not require other attentions than those which are generally known and indicated in the treatment of those affections. The wound requires more or less time to close up. The urine usually passes exclusively through it during the space of two, three, four, or five days; after which the patient from time to time experiences a desire to pass it. Finally, he expels some drops through the urethra. It gradually enters into this canal and in larger amount; and finally, from the fifteenth to the thirtieth day, passes through it exclusively. At this period the perineal wound has completely cicatrized. Nevertheless, it is not rare to find the urine take another mode in its passage outwards. In certain patients it continues to make its escape during two, three, and even four, five, and six months, in such manner that the wound may, in reality, be looked upon in the light of a fistula. In others, on the contrary, the perineal opening closes up immediately, or in the space of from eight to twelve days. A patient of M. Laugier recovered in this manner in twenty days, though he had extracted from him a calculus of more than eighteen lines in diameter, by the bilateral operation. Physick, Dorsey, and Copeland, in America, have each noticed an instance of this kind, and Béclard mentions several as the result of the bilateral operation. There are but few distinguished operators, in fact, who have not noticed a certain number of these cases; but no person has published so great a number as M. Clot, (*Gaz. Méd.*, 1830, p. 176,) who relates eleven instances, either after the lateralized operation or Vacca's process of median lithotomy.

### § VIII.—*Recto-Vesical Lithotomy.*

The anxiety that operators have evinced at every epoch to avoid wounding the intestine while performing lithotomy, proves of itself how far they were from wishing to create this incision into an established method. Hence it happens that it was not until within these

latter years that a suggestion of this kind presented itself to the minds of practitioners, and that M. Sanson, who first ventured to broach this subject in 1816, (*Des Moyens de parvenir à la Vessie par la Rectum*, Paris, 1821, in 8vo.) found in this ancient prejudice one of the greatest obstacles to the adoption of his opinions. Nevertheless, it has been since ascertained that the extraction of urinary calculi through the rectum was not altogether a new process. According to M. Clot (*Gaz. Méd.*, 1830, p. 167,) tradition speaks of it as a method which had existed in Egypt. Vegetius, a veterinary surgeon quoted by Haller, had already said, a century before, in his work published at Bâle: *Jubet per vulnus recti intestini et vesicæ aculeo lapidem ejicere.*

An observation made by F. Côme, relative to a patient in whom the recto-vesical fistula was kept up by the presence of a calculus, and who recovered after the extraction of this body through the intestine, might have served also as a foundation for M. Sanson's theory. The fragment of wood extracted from the bladder by Camper, by enlarging the fistula of the rectum, was another proof, which might also have been adduced as an authority. Moreover it is well known that recto-vesical fistulas were frequently cured at the Hotel Dieu by Desault, by incising the sphincter in such manner as to form it into a wound which should extend as far as to the perineum. However this may be, no person among us had laid it down as a principle that we should pass through the rectum to search for vesical calculi, and M. Sanson ought in reality to be considered as the inventor of the recto-vesical operation. His method, which never found many partisans in France, Germany, or England, was almost immediately adopted in Italy by a certain number of distinguished surgeons, among others by Vacca, and MM. Barbantini, Farnèse, Giorgi, Giudetti, Giuseppe, Lancisi, &c. The advantages which were ascribed to it are that of being an easy operation, and but little painful, of opening the bladder at the widest part of the pelvic cavity, of not exposing to the risk of wounding any artery, and of enabling us to extract the largest sized calculi. But the fear of having the communication of the rectum with the bladder continue after the cure, has been a sufficient reason among us to outweigh all these probable advantages. The fact is, that even at the present day, this process of lithotomy has scarcely ever been performed in our country except by MM. Sanson, Dupuytren, Pezerat, Castara, Willaume, Cazenave, Dumont, Taxil, Castel, (*Acad. Roy. de Méd.*, 25th Nov. 1824; *Arch. Gén. de Méd.*, t. II.,) and some others, that is to say, about thirty times.

A. *Operative process.*—M. Sanson saw at the beginning that recto-vesical lithotomy might be performed by two distinct processes; the one in which the prostate, urethra and the lower extremity of the rectum are alone divided; the other, which attacks at the same time the bas fond, or rather the trigonus vesicalis, together with the intestine, and in such manner as to respect the two anterior thirds of the gland. In Italy, Vacca and M. Barbantini adopted the first more especially, and to so great an extent, that they in some measure appropriated it to themselves. Geri, Giudetti, &c., adhered, on the contrary, to the second, which is the one that M. Sanson had given

especial preference to. The manner of performing both, however, differs but in a very slight degree.

I. *First process.*—The sound held by an assistant, should press accurately upon the median line, and in such manner as to depress the anterior wall of the rectum. The surgeon introduces the left forefinger into the anus to the depth of an inch; turns its nail backwards and pulp forwards; glides in flatwise upon this finger a sharp-pointed bistoury, and after having turned its cutting edge upwards, inserts its point into the groove of the sound; then elevates the wrist of the right hand, and divides the recto-urethral triangle from behind forwards, that is to say, from the intestine towards the urethra; and afterwards endeavors to find, at the bottom of this wound, the prostate, and through the membranous portion of the urethra adjusts his finger, whose ulnar border should look towards the symphysis pubis, and its nail towards the left ischium, on the groove of the sound. The same bistoury, held as a writing pen, is then inserted into the groove of the directing instrument, and afterwards glided along this groove into the bladder. It is then withdrawn while depressing the hand a little in order to divide from before backwards, almost the entire prostate, together with the other soft parts which might possibly have escaped at the time of the first incision. In this process, we divide the external sphincter, the intercussating fibres of the transverse and bulbo-cavernous muscles, the point of union of the different fibrous laminæ of the perineum, the prostate from its apex to its base, and the front part of the rectum underneath the trigonus vesicalis. One of the ejaculating ducts is also comprised in the incision, for it could only be by accident alone that the bistoury could be conducted with such precision upon the median line as to enable us to fall exactly between the two ducts. If, as might very readily happen, the incision should deviate too much upon the side, it would soon reach upon a point remote from this canal, or might even fall upon the termination of the vas deferens, and finally upon the lower extremity of the corresponding vesiculum seminale. As to the rest, no important artery presents itself, not even the abnormal branches mentioned in speaking of perineal lithotomy. In place of the operative process of M. Sanson, Vacca proposes that the right forefinger should be applied in such manner upon one of the sides of the bistoury, whose handle is grasped by the same hand, that in slightly pressing its pulp against it, it may cover the whole point of the instrument; that the whole is to be introduced in this manner to the depth required; that having reached there, the cutting edge of the bistoury is to be turned forwards, in order that the finger may be placed behind it upon its back, and that the section of the tissues should be made by a single cut, as has been just described; the left forefinger, which had remained free, is immediately to be placed upon the groove of the sound, in order that the bistoury, whose edge is then to be turned downwards, may be directed upon the membranous portion of the urethra, and thus divide the prostate and border of the vesical orifice from before backwards, that is to say, in a direction opposite to that which it had followed up to that moment.

II. *Second process.*—The first incision, which commences a little higher up, does not terminate as near the bulb of the urethra in the

second as in the first process. It is no longer the apex, but in fact the base of the prostate, that the left forefinger re-introduced into the wound now endeavors to find, and it is on a line with the posterior border or at most at the point of union of the two lower thirds with the upper third of this gland, where the bistoury should be plunged in to reach the groove of the director; it is afterwards to be pushed into the bladder, in order to lay open its lower wall to the extent of about an inch, withdrawing the instrument from behind forwards, and slightly from above downwards. The solution of continuity when we adopt this method falls, in so far as regards the first incision, upon the same parts as in the preceding. The second stage of the operation, on the contrary, avoids those portions of the urethra and prostate which receive and are traversed by the seminal ducts, and attacks the trigonus vesicalis in its place, while approximating in a greater or lesser degree to the recto-vesical cavity. Should the incision not be made precisely upon the median line, it might wound the ejaculating ducts, the vesiculae seminales and the vasa deferentia, and even the urethra. It is also perceived that the peritoneum is exposed to a very considerable degree of danger, and that it could not be avoided should it descend a little lower than usual. It is also to be remarked that in consequence of the direction given to the bistoury while it is being withdrawn from the bladder, the wound must fall to a much greater extent upon the last organ than upon the intestine, and that it is consequently prolonged much higher on the inner surface of the bladder than upon that of the intestine; so that the mucous membrane and a great portion even of the muscular coat of the rectum will descend in the form of a projection or valve, to the distance of several lines below the wound in the bladder. Some Italian surgeons have supposed that M. Sanson's process might be improved by placing a dilating instrument in the interior of the rectum. It was with this view that M. Geri, for example, had proposed a large gorget. At first view a modification of this kind would appear to possess the advantage of diminishing the mobility of the tissues, which M. Pézerat had so much difficulty in overcoming in the recto-vesical operation as performed by him, and to have the advantage also of actually giving greater facility to the incision. Vacca, however, has vehemently opposed this modification. It must be readily perceived, in fact, in reflecting upon it, that it would increase the difficulties of the operation instead of diminishing them. However, it is not in respect to its mode of execution that objections may be raised against lithotomy by the rectum. All the ameliorations proposed in reference to this point are not in reality of a character to deserve any particular attention.

B. If we should be disposed at the present time to form a just appreciation of the *value* of recto-vesical lithotomy, we could do so, as it appears to me, without any difficulty. Its first advantage, and the most indisputable of all, is that of protecting us from hemorrhage; the second is that of possessing an extreme degree of simplicity. We should not however deceive ourselves on this point. The division of the mucous membrane of the anus, of the walls of the intestine, and even of the posterior portion of the perineum, is attended in certain patients with all those difficulties which are pointed

out by M. Pézerat, whatever may be the precautions we adopt to stretch the tissues.

In opposition to those who accord to it the advantage of affording so easy an egress to the urine that we have no cause to fear infiltration, it may be stated that the recto-vesical septum, drawn upon by the instruments or by the stone during the operation, is sometimes liable to be lacerated, and that in such cases we cannot perceive what would prevent the effusion of some drops of urine into the surrounding cellular tissue. There is another objection, which is this, that from the infiltration taking place above the pelvic aponeurosis, it would very quickly spread to the sub-peritoneal cellular tissue of the pelvis. The advantage, which it is alleged to have, of allowing of a large incision and the extraction of enormous calculi, may also be contested. It is a grave error, in my opinion, to refer the difficulties in such cases to the degree of distance existing between the bones. I cannot conceive any more than Scarpa how, in any process of lithotomy whatever, the lower strait, should it be of regular conformation, could present an obstacle to the extraction of a stone. It is at the opening made into the bladder where all the embarrassment lies. When this opening is directed exclusively upon the bas fond, we are not enabled to give it more than from twelve to fifteen lines, because there is only this distance between the prostate and the cul de sac of the peritoneum. Whence then is the advantage, since in bilateral lithotomy, for example, we may obtain an opening of from fifteen to twenty lines? If we limit ourselves to the incision of the prostate with the expectation of not going beyond its limits, the division can have but from eight to twelve lines, even supposing we give it its greatest extent. If we give it a greater extent we necessarily go beyond the border of the gland, because in this direction there is only from six to seven lines of it to divide; if we should unite the two processes, the opening might be extended to an inch and a half or two inches; but up to the present time this has been proposed by no one. Bilateral lithotomy, moreover, could also furnish us as extensive a division. Finally, if we no longer adopt the rule which directs us to confine ourselves to the periphery of the prostate, it is evident that we might, by the bilateral method, incise the neck of the bladder upon each side, in such manner as to obtain a wound of two or two and a half inches in extent; which would not be possible in the recto-vesical operation but by voluntarily exposing ourselves to the risk of wounding the peritoneum. It would appear that in speaking of this process some importance has been attached to the division of the perineum and membranous portion of the urethra. The same error also is found in almost all the discussions in relation to the other kinds of cystotomy. Nevertheless, it is easy to perceive that in regard to the passage of the stone, there is nothing else but the enlargement of the posterior opening of the urethra which can be taken into the account as of any value. Thus enlarge it directly backwards and you will never obtain any more than an opening of seven to eight lines unless you go beyond the prostate; whether the exterior incision be confined to the perineum, or whether it includes at the same time the extremity of the rectum. In prolonging this incision an inch or an inch and a half farther, you

will traverse the whole extent of the trigonus and will give to the wound a length of only about two inches, while at the same time exposing yourself to the risk of wounding the peritoneum. The double oblique incision, on the contrary, enables us to go to the extent of twenty lines or more without encroaching upon the apex of the bladder, and if you are not afraid of going beyond the prostate you will evidently be enabled still to increase the dimensions of the wound to a much greater extent than by the posterior method. As to the lesion of the arteries, the point to ascertain is, whether this can counterbalance the danger of recto-vesical fistulas.

In transversal lithotomy it is almost certain that hemorrhage cannot take place in one case out of 100; while the recto-vesical operation is followed by a urinary fistula, at least in one case out of every four or five. The hemorrhage also is far from being always fatal, while the fistula is a disgusting infirmity, which is in most cases incurable. The recto-vesical operation has furnished, up to the present time, almost as great a proportion of deaths as the processes of perineal lithotomy. It possesses in a special manner the disadvantage of unavoidably wounding one of the ejaculatory ducts. Experience has shown that it frequently causes enlargement of the testicles, and serious affections of these organs. In one of the patients of M. Geri, (*Arch. Gén. de Méd.*, t. XII., p. 236,) the duplication of the perineum was laid open. M. Janson, (*Mem. de la Soc. Méd. de Gand.*, 1835, p. 93,) lost two patients out of six cases. The intestine was found to be inflamed to an intense degree. Many authors show that the bladder has been frequently inflamed by the passage of stercoral matters into this organ. Scarpa states that it gangrened in two cases noticed by him. The vesiculæ seminales have also been laid open, and purulent collections in the interior of the pelvis have been met with in a great number of instances. Finally, out of about 100 operations of this kind, which appear to have been performed up to the present time, by MM. Sanson, Dupuytren, Camoin, Pezerat, Willaume, Cazenave, (*Bull. Méd. de Bordeaux*, 1833, p. 121,) Dumont, Castara, Urbain, Janson, Taxil, Barbantini, Vacca, Géri, Orlandi, Gallori, Mansfredi, Guidetti, Farnèse, Giorgi, Giuseppe, Cittadini, Mori, Lancisi, Castaldi, Cavarra, Regnoli, Bandiera, (*Bull. de Fér.*, t. II., p. 156,) Heihg, (*Ibid.*, t. I., p. 346,) Fasoti, (*Ibid.*, t. I., p. 352,) Meli, Clot, (*Compte rend. de l'École de Méd. d'Abou-Zabel*, Paris, 1832, in 8vo.) Wenzel, (*Bull. de Fér.*, t. VI., p. 280,) Dawson, (S. Cooper, *Dict.*, p. 15, 7th edit.,) and Lallement, Lafosse, (*Ephem. Méd. de Montp.*, Dec., 1828,) we count about 20 deaths, the same number of fistulas, and a variety of accidents which have placed the life of some of the other patients in danger. The following table moreover, (*Extrait du Journ. des Chir. von Graefe und Walther, achter band*, scite 540, par M. A. Belin,) will furnish a complete detail of these cases.

## RECTO-VESICAL OPERATION FOR STONE.

## First. Cases followed by Complete Cure.

Operators.	Age	Operative process.	Size and weight of the calculus.	Escape of fecal matter through the urethra.	Duration of treatment.	Remarks.
Camoin,	20	1st process, ditto.	weight, 2 ounces, Length 21 lines, breadth 1 inch, medium size,	frequent, none, occasional,	less than two months, about two months, 52 days,	The cure was retarded by the complication of catarrh of the bladder.
Pezerat,	17	ditto.				
Dupuytren,	3 11	—				
Vacca,	3 38	2nd process,	size of a pigeon's egg,		30 days,	Complicated with diarrhea, dysentery, Fyuria or purulent urine, or hematuria.
Vacca,	4 74	"	50 small calculi,		25 days,	
Vacca,	5 33	"	size of a large pigeon's egg, with a prolongation,		1 month,	
Vacca,	6 2	"	length 10 lines, breadth 3 lines, weight 4 ounces,		14 days,	
Vacca,	7 60	"		none,	60 days,	The stone was broken. An habitual stricture of the urethra retarded the cicatrization.
Vacca,	8 46	"			4 months,	The stone was broken. A sickly constitution and urethral coarctations retarded the cure.
Vacca,	9 11	"			22 days,	
Vacca,	10 12	"			1 month,	
Vacca,	11 15	"			22 days,	About eight days after the operation the testicles swelled up in consequence of the patient's going out.
Vacca,	12 65	"			12 days,	
Vacca,	13 8	"	medium size, 2 calculi of medium size, tolerably large,		35 days,	Of a scrofulous appearance; weak health, purulent urine, pain extending as far as the left kidney. After the operation, he had nightly attacks of fever, and a large quantity of gravel was evacuated by the urethra, and through the wound.
Vacca,	15 6	"			6 months,	On the 30th day from the operation, after making a violent effort to urinate, the wound burst open. The urine contained much gravel.
Vacca,	17 14	"	sized of a pigeon's egg, very large, 19 lines in its long diameter,			
Vacca,	20 6	"	length 1½ inch, breadth 11 lines,		2 months,	

*First. Cases followed by Complete Cure.—Continued.*

Vacea,	21	16	2nd process, small, fragile,	45 days,	Some drops of urine only issue through the wound, a few days before the ordinary time.
Vacea,	22	10	"	36 days,	
Vacea,	24	3½	"	12 days,	
Giorgi,	2	1	1st & 2d proc. —	20 days,	Unequivocal symptoms of a diseased bladder
Giorgi,	3	12	"	2 months,	
Giorgi,	4	2½	"	12 days,	
Giorgi,	5	5	"	17 days,	
Giorgi,	6	9	"	24 days,	
Giorgi,	7	4	"	nearly 1 mo.	The stone was extracted by means of the fingers.
Giorgi,	8	12	2nd process, about 34 days,	—	The urine was turbid, sanguinolent, purulent, and of an infected odor.
Giorgi,	9	53	2nd process, about 34 days,	—	with which (as was seen afterwards) it had several adhesions. There followed some inflammatory symptoms, which were subdued by bleedings.
Giorgi;	10	4	—	8 days,	
Cittadini,	1	12	2nd process, medium size,	20 days,	
Cittadini,	4	6½	—	12 days,	
Farnese,	1	50	2nd process, ditto	—	
Barbantini,	1	50	2nd process, ditto	—	
Guisope,	—	75	2nd process, ditto	80 days,	
Camici,	1	7th.	size of a hen's egg, ditto	80 days,	
Geri,	1	"	size of a hen's egg, ditto	80 days,	
Janson,	1	3	1st process, ditto	ditto	
Janson,	2	7 m.	ditto	ditto	
Janson,	3	30	ditto	ditto	
Janson,	5	—	round, ½ inch diameter,	—	
Orlandi,	6	—	tolerably large size, 3 calculi, the largest of which was the size of a small nut.	—	
Bandiera,	—	y.m.	1st & 2d proc. small calculus,	17 days,	
				45 days,	

*First. Cases followed by Complete Cure.*

Regnoli, Moschi,	1   8 1   73	1st & 2d proc. 2nd process,	3 calculi, the size of a large nut,	matter passed, —	40 days, a little over a month, 14 days,	
Moschi, Moschi,	2   16 3   40	ditto ditto	—	—	—	The calculus was adherent on one side. The patient had vesical fistulas and strictures of the urethra, which, after 15 days caused the urine to flow anew through the intestine; the use of an elastic bougie soon made all right again.
Malori, Galfredini	—   — —   2	—	—	—	—	
Cavarra,	60	In his first 5 cases Cavarra modified the 2nd opera- tive process.	3 calculi each an inch in diameter,	—	12 days,	
Cavarra,	3   62	—	—	in the space of about a month,		
Cavarra,	4   3	“	—	in the space of 20 days,		
Cavarra, Cavarra,	6   53 7   71	2nd process “	size of a small nut,	18 days, 18 days,		
Cavarra, Cavarra,	8   9 9   2½	“	shape and size of a small nut,	about 20 days,		
Cavarra,	10   60	“	size of a small nut, the calculus was broken into several pieces, 2 large calculi, large, and was broken into pieces, 2 calculi of 2 inches in their great diameter,	19 days, 25 days,		

*Second. Cases followed by Fistula.*

Vacca,	2   5	2d process,	—	none,	48 days,	
Vacca,	23   2	ditto,	medium size,	some escape,	18 days,	
Gio. gi., Cittadini,	1   28 3   7	1st process, 2d process,	“	ditto,	27 days,	
		small calculus,	none,			

The fistula was almost closed on the day that the operation was published.

The escape of fecal matter through the urethra in this case might be attributed to the too prompt re-union of the sphincter ani.

Some drops of urine escaped through the fistula.  
A few drops of urine escaped by chance.

*Second. Cases followed by Fistula.—Continuea.*

Cittadini,	5	70	2nd process, combined with the first, ditto,	large calculus,	—	30 days,	
Mori,	50			2 calculi, weighing 9 ounces,	matter escapes,	—	
Cliet, Geri,	12		2nd process, size of a small nut, Vacca asserts that Geri adopted the 1st process.	size of a small nut,	no natrur obser- ved to escape.	—	The patient died of tubercular phthisis 3 months after the operation.
Dupuytren,	1	57		size of a large nut,	quite frequent,	25 days,	
Dupuytren,	2	—		“	—	—	
Cavarra,	1	70		Broken in pieces.	—	about a month,	

This patient had already been twice operated upon for stone, and there remained a fistulous opening after the first operation. This was the preceding case, after an interval of six months. This operation must have succeeded like the first. Frequent contraction of the urethra.

*Third. Cases followed by Death.*

Operators.	Age.	Operative process.	Size and weight of the calculus.	Time of death.	Remarks.
Dupuytren,	4	13	2 inches 4 lines, 1 “ 8 “ 1 “ 4 “	on the 36th day,	There was a vast abscess between the rectum and <i>bas fond</i> of the bladder.
Vacca,	1	70	2nd process, very long,	“ 4th day,	Inflammation of the lower belly. Gangrene of the internal surface of the bladder to which the stone adhered.
Vacca,	14	6	size of a pigeon's egg,	“ 8th day,	During the night following the operation, pain in the hypogastric region; fever came on, and went on constantly increasing. The post-mortem examination showed traces of inflammation in all the organs contained in the pelvis.
Vacca,	16	55	ditto,	About 2 months after the opera- tion,	At the time of his entrance the patient was very thin. A diarrhea set in, and a short time after there was jaundice to a certain extent, but death occurred without being preceded by distinctly developed evidences of the disease. The examination after death showed the bladder and organs contained in the pelvis in their normal condition. The wound of the neck of the bladder and of the prostate had healed; only that of the membranous portion of the urethra remained un cicatrized. The two ejaculatory canals were entire; either they had not been divided, or had healed. The substance of the liver had been transformed into tuberculous and scirrhouous matter; this organ was atrophied, whilst the gall bladder was much larger than usual.

*Third. Cases followed by Death.—Continued.*

Vacca, 18	56	2nd process,	2 lines in diameter, and by which the stone was extract- ed,	on the 11th day,	Robust constitution, sanguine temperament, extraordinary embonpoint. On the 16th day there was fever and delirium, and three exacerbations of fever daily. The autopsy showed that the intestines, peritoneum, and the other abdominal and pelvic organs were without traces of inflammation or any other lesion. The wound was situated between the seminal ducts, neither of which had been touched.
Vacca, 19	55		2 calculi of consider- able size,	6 hours after,	This patient was of a robust constitution; he was in the habit of taking opium. Shortly after the operation and again a little later, 8 grains were given him. There followed irregular movements of the muscles of the face, with paralysis of the extremities and coma. By the autopsy, the prostate, which was found much larger than in its normal condition, projected about an inch into the bladder, and separated the fundus from the neck of that organ in such a way that the fundus had quite the appearance of a sac which could have contained two stones.
Cittadini, Barbantini, Geri, Janson, Janson, Janson, Regnoli, Martini, Meli, Cavarra,	70	2nd process,	extraordinary size,	40 hours, — — — — — — — — — adult,	This patient died during an attack of epilepsy; an effusion of blood was found within the cranium. Subsequently to the operation, all hope was lost, in consequence of an internal pain which showed itself in the bladder. The urine contained fecal matters. Peritonitis took place afterwards. The peritoneum was wounded. Intense peritonitis. An ulcerated bladder, and its internal surface covered with gravel. The stone could not be extracted in consequence of its size and adhesions. Died in consequence of the incessant and obstinate reproduction, in spite of every remedy, of a large quantity of worms, which terminated in a slow and obscure pneumonia. The lymphatic ganglions, especially those of the lower belly, were hypertrophied. A short time after the operation, inflammatory symptoms appeared. Autopsy: The prostate projected like a uterus. The ureters were four times the natural size, and full of pus. The kidneys presented the same appearance, having their tubular and cortical portions destroyed. A strong constitution and sanguine temperament. The operation was easily performed. On the night after the operation, there was intense pain in the bladder, fever, suppression of urine, black vomiting. Autopsy: The bladder large and indurated, somewhat cartilaginous, the bottom of the wound mortified; the right ureter and kidney inflamed.
	—	1st process,	quite advan- ced, child,	24 hours, — — — — — — — — — 3 days,	
	26		children,	24 hours, 15 days,	
	79		—	very large, —	
	7	2nd process,	—	—	
	2		—	—	
	4		—	—	
	12	ditto,	—	—	
	5		the size of a hen's egg, $3\frac{1}{2}$ ounces,	10 hours,	

### § XI.—*The Hypogastric Operation.*

We do not find in the ancient authors any definite expression in relation to the operation of opening into the bladder above the pubis, in order to extract calculi from it. It appears certain that Philagrius in recommending that we should incise *superné juxtā glandis magnitudinem*, merely intended to speak of calculi arrested in the urethra, and that in opening into the dorsum of the penis, his only object was to prevent fistulas, which were much more to be apprehended when the incision was made in the lower wall of the urinary passage. On the other hand, we cannot find what grounds M. S. Cooper has for supposing that the operation performed by Collot in 1475, had reference to the hypogastric operation rather than to nephrotomy, or to any thing else we please. It was unquestionably Franco to whom we are indebted for this process; and this practitioner also was led to it, so to speak, in spite of himself, and is careful to warn others against imitating his conduct. Rousset, who gave a detailed description of it in 1581, 20 years after the publication of Franco's work, is therefore the first person who positively recommended it, and who endeavored to have it adopted as a general method. Nevertheless, the manner in which he mentions it, would induce us to believe that other physicians also at his time had spoken of it. However this may be, Rousset, in consequence of the death of Henry III., who had promised to assign to him three or four criminals, in order to make trial of it, was not enabled to perform it upon the living body, and no person appears to have thought of it since his time up to the epoch at which Mercier undertook to defend it at the faculty of Paris, in a thesis of N. Piètre, in 1635. Some surgeons finally adopted it, and Collot relates that in 1681, Bonnet, of the Hotel Dieu, had performed it with complete success, in the presence of Petit. Some years subsequently, Proby, from finding himself unable to extract a calculus, through the usual routes, also had recourse to it, and Groenvelt, in a work published at London in 1710, declared himself its avowed champion. Nevertheless, it was still so little known, that Douglas, in 1718, at one moment supposed himself to have been the inventor of it. The successful results which this last surgeon obtained from it, having finally opened the eyes of practitioners, hypogastric lithotomy soon became a subject of investigation with Cheselden, MacGill, Thornill, Middleton, Bamber, and Pye, in England. Morand, who made trial of it at the Invalides on the 27th May, 1727, on an officer 68 years of age, saw it performed on the 10th December following, by Bérier, at St. Germain-en-Laye, on L. Amon, who was four years of age. It was also performed by J. Robert, Sermès, Kulm, and Heuermann, and especially by Heister, who defended it in a thesis, supported by Weise, at Helmstadt, on the 8th September, 1728, and who cited instances of it from Runge and Præbisch, so that it appeared to be on the point of being generally adopted. In 1727, Cheselden, who had performed it on 6 patients, had yet lost but one, and Douglas also one only, out of 9 cases. Out of 12 cases, Thornill lost only two, and MacGill but one out of 4. Nevertheless, the great excitement produced by the appearance of F. Jacques, soon caused it to fall into disuse, and there was scarcely anything more said of it until F. Côme

in his turn undertook to bring it into repute, in 1775. From that time, Le Blanc and Bazeilhac declared themselves its partisans. Lassus, as well as Deschamps, Dupuytren, Boyer, M. de Guise, and several others, also occasionally had recourse to it, but only in the character of an exceptional method. Notwithstanding all the justifications that had been employed in its defence, and the numerous successful results which had been obtained from it in France, by M. Souberbielle, the inheritor of the principles of F. Côme and Bazeilhac, the high operation had again fallen into disrepute, until in consequence of the improvements proposed by Scarpa, Dupuytren, Everard Home, and Gehler, it was a third time attempted to demonstrate its advantages, and to substitute it for the perineal methods. It consists of an incision into the anterior wall of the bladder, through the parietes of the abdomen.

A. *Examination of the methods.*—The high operation has not presented as many methods as perineal lithotomy, and the processes which belong to it can scarcely be considered in any other light than as modifications of each other. In order to analyze them with some degree of method, I classify them under three different heads. In the first, we operate without the previous introduction of a director. In the second it is directly the reverse; while the third is distinguished from the two others in this, that we make an accessory opening below the pubis.

I. *Method of Rousset.*—The first method of performing hypogastric lithotomy, is the one recommended by Rousset. We begin by injecting barley water, tepid water, milk, or in fact any vulnerary decoction into the bladder, in order to distend it, and to oblige it to project above the pubes. In order that the liquid may not escape contrary to the intention of the operator, a ligature is placed around the penis of the patient, or an assistant is directed to compress it. The integuments, and the aponeuroses are incised upon the median line by means of a razor. A bistoury which is slightly concave, is then introduced obliquely downwards and backwards between the symphysis and the bladder, with its back turned towards the bones, in order to open into this organ with considerable caution. Should the puncture be very large, the bladder would be immediately emptied. It is necessary that it should be sufficiently so only as to enable us to introduce a lenticular bistoury, by which the wound is to be immediately enlarged from below upwards, but in such manner however, as not to go as far as the peritoneum. The stone finally, is extracted by means of the fingers alone, or by the fingers wrapped in linen, or by the scoop or tenacula.

a. *Douglas* has modified the process of Rousset in two respects. He recommends that the organ should be but moderately distended by the injection, in order that it may not incur the risk of having its fibres paralyzed, and because its excessive distension is in most cases insupportable. He substitutes a convex bistoury for the razor. The straight bistoury, which he employs in preference to the curved, enables him at the same time to make the puncture into the bladder, and also to enlarge this wound immediately without having recourse to the probe-pointed bistoury.

b. *Cheselden*, who also does not like any great distension of the

bladder, recommends the patients to retain their urine as much as possible, and that we should inject only a quantity of liquid equal to that which they ordinarily discharge. When he has laid bare the aponeurosis with a convex bistoury, and divided the linea alba with a straight bistoury, he prefers a concave bistoury, and not probe-pointed, for opening into the bladder from above downwards, and no longer from below upwards, as is recommended by Rousset and Douglas. The curved scissors, recommended by MacGill in place of the bistoury at this last stage of the operation, would expose us too much to the danger of wounding the peritoneum, to allow of their adoption, and are in every respect of too little advantage to render it necessary that we should examine a modification of this kind.

c. *Morand* scarcely modified the process of Rousset except in this, that he made his patient lie down in the opposite position, with his head and chest lower than the pelvis, and his legs secured to the posts of the bed. He also insists upon the danger of forced injections, and endeavors, moreover, to show their inutility. With him the straight bistoury for the incision of the abdominal walls, and the concave bistoury for the bladder, were found quite sufficient. It is to him we owe the suggestion of making use of the left forefinger, bent into a hook, in order to retain the bladder at the upper angle of the wound, while we completed its division, as had also been recommended by Heister.

d. Others, and *Le Dran* in particular, considered that in place of incising the bladder from above downwards, it would be better to divide it transversely, and that by acting in this manner, we should run less risk of wounding the peritoneum. *Winslow* alleged that we might dispense with injections by making the patient drink freely of a diluent ptisan for some weeks before subjecting him to the operation, and pointed out to *Morand* that the position chosen by this last was but little suitable. According to him, *Thibaut*, of the Hotel Dieu, had suggested the idea of returning to the incision from below upwards, and recommended, like *La Peyronie*, that we should plunge the bistoury into the bladder with one movement, in such manner as to divide the whole thickness of the tissues while withdrawing the instrument. *Lecat* followed this advice in the two patients upon whom he performed the high operation. His cystotome bistoury introduced by puncture, with its back turned downwards, enabled him to divide the bladder above, and then to retain this organ momentarily suspended by means of a projection on the convex border of the bistoury, and which was suddenly turned round in this direction until the surgeon had replaced it by a suspensory hook.

e. In these latter times the process of Rousset has again undergone some modifications. *M. Baudens* says he has done very well without introducing any liquid into the bladder, and in laying bare this organ a little towards its side, as had already been recommended by *Piétre*, *Solingen*, &c., also in introducing the left forefinger down to the posterior side of the pubes, in order to crowd back the peritoneum from below upwards, and to make tension upon this membrane at the same time as upon the bladder; then to plunge the bistoury into the cavity of this organ from above downwards, and immediately to introduce the finger into it in the manner of

Morand, continuing the incision in the same direction without stopping, down to near the neck of the bladder. M. Baudens (*Bull. de Fér.*, t. XX., p. 224) also thinks that we should incise laterally the rectus muscle as well as the lips of the wound of the bladder, as had already been done or recommended by MacGill and Le Dran, when any difficulties presented themselves in regard to the extraction of the calculus.

f. *M. Tanchou* has supposed that he could render this process more easy by using a species of flattened trochar with a sheath, grooved on one of its borders, and a joint at a certain distance from its extremity, and the rod in which, having a cutting edge, transforms it into a bistoury. The operation is performed in the following manner. The operator incises upon the median line down to the front of the peritoneum, by means of a convex bistoury. By means of the left forefinger introduced into the bottom of the wound, he recognizes the fluctuation of the bladder, which has been moderately distended by an injection of tepid pater; then plunges in his instrument from above downwards and from before backwards; withdraws its cutting blade by means of a spring; when its sheath immediately bends into a right angle, forming a suspensory hook developed in the interior, and upon the lower border of which a probe-pointed bistoury is to be conducted, in order to enlarge the wound.

g. Finally, *M. Vernière* (*Bull. de Fér.*, t. XX., p. 224) has considered that he has introduced an advantageous modification into practice, in proposing a previous operation, which consists in incising the hypogastric wall in order to introduce between it and the front part of the bladder a plate which is destined, by acting from behind forwards, to compress the peritoneum against the inner side of the recti muscles during the space of several days. The adhesions which result from this compression will enable us, he says, to open into the bladder without the slightest danger of penetrating into the cavity of the abdomen. A suggestion similar to that of *M. Vernière* has been communicated to me by *M. A. Vidal*. This surgeon proposes to perform the operation in two stages, with an interval of several days between. The first, which consists of an incision through the tissues, which separates the bladder from the external surface, has for its object to render the cellular layers impermeable by inflaming them. The second consists in opening into the bladder, which, according to the author, will by this means be no longer exposed to urinous infiltrations.

h. *Appreciation*.—There is not one of all these modifications which in reality deserves an absolute preference over the others. That of Morand, so far as regards the operation properly so called, is, as it appears to me, the most prudent. To make the patients retain their urine in order to distend their bladder, is a thing which may be more easily recommended than carried out. All that is necessary to convince us of this is to recall to mind how frequently calculous patients have an inclination to urinate. The injections could not, in fact, be supported if we persisted in throwing them up in such quantities as to make the bladder project above the pubes. But in the majority of cases we have no difficulty in giving it a

moderate degree of distension by the injection of an emollient liquid, which is sufficient to enable us easily to recognize its presence behind the pubes by means of the finger introduced through the wound at the linea alba. As to the nature of the liquid to be injected, milk, to which Middleton appears to give the preference, and of which Rousset himself had already spoken, is evidently, on account of its tendency to decomposition, less suitable than mallows or barley water, or better than all these, a certain quantity of tepid water. Air, the suggestion of which is ascribed to Solingius, (*Thèses de Haller*, French transl., t. II.,) though already mentioned by Rousset, when he says that it was recommended in his time to fill the bladder with *wind*, would possess no advantage over any liquid whatever, and merits the little importance that was given to it. As to the precept of Bamba, who recommends that the injection should not be thrown up until after the incision made through the linea alba, and that of Middleton, who thinks that we should at least then throw up a little more than before commencing the operation, they have been long since rejected. The incision from below upwards with a straight bistoury, as in the process of Douglas, or with the probe-pointed bistoury, according to Rousset, would enable us, if necessary, to take a point d'appui against the pubis and to proceed with a certain degree of security; but it is undeniable that we would in this way incur too great a risk of perforating the peritoneum, and of *opening into the belly*, as was remarked by Cheselden. In adopting the incision from above downwards it is almost a matter of indifference, provided we are sure of our hand, whether we prolong it with the scissors or with the probe-pointed, straight or curved bistoury, or with the ordinary straight bistoury. The transverse division of the bladder would have the inconvenience, as Winslow remarks, of presenting a wound which would be perpendicular to the direction of the external incision, and which, by retracting behind the pubes, would peculiarly expose to the danger of urinary infiltrations. It is also very evident that the lateral incision of the recti muscles, as practised by Pye, and at another time by Dupuytren, and which Gehler in our time has proposed to establish as a rule, is not applicable except in those rare cases in which spasmodic contractions take place in so violent a degree as to prevent the introduction of the fingers or tenacula into the bladder through the wound, as I saw occur in a patient operated upon by M. Roux at La Charité in 1827. The process of M. Baudens would have the serious inconvenience, by detaching the peritoneum of causing too extensive a laceration of the cellular tissue. There can be no doubt that in those cases in which the bladder has entirely receded to the bottom of the pelvis, the operation would be attended with very considerable difficulty if no injection was used. The bare mention of the suggestion of M. Vernière is sufficient of itself, as I consider, to enable every one to appreciate it at its just value. That of M. Vidal is more simple and more rational. As to the combination of M. Tanchou, its prudence cannot be questioned; only as it exacts a particular instrument which has no other advantage than that of enabling us to introduce a hook into the bladder, at the same time that we penetrate into it by the puncture, and as the puncture into this organ, by means of a

bistoury, enables us almost always immediately to introduce into it the finger or any suspensory instrument whatever, this process I presume will not be adopted by practitioners. Some ancient authors had already however seemed to have felt the necessity of such a process, for Heister recommends that we should make the puncture into the bladder by means of a grooved trochar, which could afterwards serve as a director to the bistoury.

II. *Method of Franco.*—Dionis and Tollet consider that the surgeon might confine himself to the method adopted by Franco, that is to say, to introduce two fingers into the rectum, in order to raise up the calculus towards the hypogastrium, so that we might cut down upon it a little to *one side* of the linea alba. They find this method easy and simple, and more certain than that mentioned by Rousset. If the stone were of such small volume, the symphysis of such inconsiderable height, and the aggregate of the parts of so little thickness, as to enable the fingers to push the foreign body in this manner to as far as above the pubes, this process would possess real advantages, and would deserve to be adopted. Proby used it, and it was by this process that Lassus, M. De Guise, and some others were enabled to remove from the bladder calculi, which they had found it impossible to extract through the perineum. It is nothing more in fact, than the little operation of the ancients transferred to hypogastric lithotomy, with this difference, that above the pubes there would be less inconvenience in cutting down upon the stone, than if we had to extract it through the lower strait. As to the manipulation of the operation, it is altogether useless to give it in detail. Franco merely says, that his patient was operated upon “on the mons veneris, a little to one side, and over the stone, while he raised up this last with his fingers, which were in the fundament, and keeping it moreover under his control by means of the hands of an assistant, which made compression on the lower belly.” It is well to remark, en passant, that Franco had not previously incised the perineum in the infant, two years of age, mentioned by him, as has been repeated in a great number of works, and that it was only after having found that all his efforts to depress the stone were useless, that he decided upon “cutting the said infant above the ossa pubis.”

III. *Method of F. Côme.*—Hypogastric lithotomy appears to have undergone in its successive modifications, almost all the varieties of the perineal operation. In the same way, as for a long time it was the practice to make the stone descend towards the neck of the bladder, in order to incise the parts over it, so also has it been with the high operation. In this latter, however, they soon adopted the precaution of distending the organ by means of injections. In the last century Bamber, Cheselden and Foubert suggested the same course for the purpose of avoiding the employment of the conducting sound. Finally, if it was thought that this last instrument was indispensable in all the processes of the low operation, so also have a great number of authors recommended its employment in the supra-pubic method. Rousset refers to it without being an advocate of it. It appears that at his time it was a hollow and grooved sound, which could be used at the same time as a catheter for making the injections, should they be deemed advisable, and also “as a sound for directing the incision

in the manner of the *Marianists*;" that is to say undoubtedly, that we could turn either its groove or its convexity forward, which, however, would not be an easy matter. At a subsequent period the sound was recommended by Piètre, Heister, &c. ; by some for the purpose of distending and raising up the bladder, while several others had a groove running along its concavity, for the purpose of directing the point of the bistoury. But the instrument which has attracted most attention in this respect is the one contrived by *F. Côme*, and which gave this ecclesiastic so great a predilection for the high operation, that from the year 1758 to 1779 he had already made use of it in 100 cases. This instrument is known under the name of the *sonde-à-dard*. It is introduced in such manner that its extremity may glide from below upwards, behind the symphysis, and reach above the pubes while passing against the anterior region of the bladder. The walls of the belly having been incised, the point of the instrument is made to project slightly into the wound, by making a slight pressure on its plate outside, as if for the purpose of pushing it back and depressing it. The surgeon seizes it through the walls of the bladder by its projecting extremity, with the thumb and forefinger of his left hand, or he applies in front of it a sort of canula which flares open like a funnel. The dart (*le dard*) being pushed from below upwards, perforates the bladder in escaping from its sheath, in order to come to the outside. Whether the extremity of this dart shall have been unscrewed, in order that we may leave its stem only in the wound, or whether it consists only of a single piece, the bistoury is to be guided on the groove of its concavity, then from above downwards, and from before backwards, in order to incise the walls of the bladder to such extent as may be deemed advisable. Nothing more remains to do than to withdraw it into its sheath, the projecting point of which had not left the bladder, and which itself is to be immediately removed. The other stages of the operation are the same as in the process of Morand.

a. We perceive that the *sonde-à-dard* enables us to dispense entirely with injections, that it stretches the parts to a proper extent, and that its grooved stem becomes an excellent conductor when we wish to enlarge the opening into the bladder with the bistoury. With the view of giving it still greater efficacy, Scarpa and M. Belmas have made some modifications in it. Thus, it has been frequently objected to it, that it may wholly escape through the puncture made by the dart, and allow the bladder to retract before it was possible to open into it with the bistoury.

The surgeon of Padua remedies this inconvenience in the following manner. His catheter is not grooved except at some lines distance from the extremity, which latter consists of a beak dilated into an olive shape. This groove is moreover very wide and deeply excavated, in order to leave on each side of the stilette a furrow of sufficient depth to enable the point of a bistoury to glide upon it. The perforating stilette, intended to pass through it, separates from it by degrees, and goes beyond it to the distance of two or three lines in advance of its extremity, which latter in this manner is retained in the bladder, and cannot escape from it to follow the stilette. Scarpa also alleges that the nail can always distin-

guish its borders through the walls of the bladder, and that the bistoury may be conducted upon it without any danger by passing on one side of the stilette. The sound of M. Belmas, however, is so complicated that it will not be adopted at least in its essential points. Other conducting instruments have also been proposed at various epochs. Cleland, for example, proposed in the last century a sound, which after being introduced into the bladder, opens like a forceps and enables us in this manner to make a greater or less degree of tension upon the walls of the organ. Kuhl, L'Heritier, &c., have produced nothing better, and the very complicated apparatus which M. Rouget wished to bring in repute some years since, and the object of which was to enable us with one movement to make an immediate perforation of the entire thickness of the walls of the belly and bladder, also does not deserve to be revived. M. Leroy d'Etiolles, (*Cystotomie Epipubienne*, Paris, 1837,) has contrived aponeurotomes, (*Oper. Cit.*, fig. 1, 2, 3, 4, 5, and p. 9. 10, 11,) suspensory cystotomes, (*Ibid.*, pp. 18. 19, fig. 7, 8, 9, 10, 11, 12, 13,) dilating hooks, (*Ibid.*, pp. 22, 23, fig. 14, 15,) &c., the use of which also in my opinion do not appear to promise any great advantage. The only question to be determined would be, if the conducting instrument was exclusively designed to stretch the organ and to prevent its retracting, or if it was at the same time intended to perforate this cavity from within outwards, in order to serve as a more certain guide for the bistoury, destined to complete the incision. In the first case, an ordinary catheter would sufficiently carry out the views of the surgeon; in the second, the *sonde-à-dard*, whether simple, or such as it has been modified by Scarpa, leaves certainly nothing to be desired.

b. *Button-hole Incision*.—The employment of conductors has not been the only change made in hypogastric lithotomy. Various surgeons have proposed to make an opening *underneath the pubes*. This opening, which had already been performed by the Dutch surgeon, Sermès, who on that account was even pursued by the tribunals and defamed by envy, sometimes consisted only of a simple puncture, and at others resembled in some respects the lateralized operation. Sermès recommends that we should use it for conducting the suspensory sound. Palluci made a puncture with the trochar at the same point, and left a canula remaining in the wound. Deschamps recommends that the puncture should be made at the rectum, in order that it may give passage to the instrument which has been provided with its arrow, (flèche.) It is, however, to F. Côme that the supplementary incision chiefly owes the reputation which it has enjoyed. This lithotomist, who commenced his operation with it, incised the membranous, and also in part the prostatic portion of the urethra upon a grooved sound, and then made use of the wound to introduce through it the sonde-à-dard into the bladder. After the operation, a large short canula, left to remain in the solution of continuity, served by giving egress to the urine, to prevent its effusion towards the hypogastrium. The arguments presented, and the successes obtained by F. Côme, for a moment led to deception on the importance to be attached to an incision of this kind; but some persons soon asked themselves the question, if this process could in reality possess any advantages for the high operation, or whether it would

not, on the contrary, complicate it in a dangerous manner. It was easy to perceive—1st, that the wound of the perineum did not prevent the urine from getting into the hypogastric wound; 2d, that it is not required for the introduction of the sonde-à-dard; and 3d, that it must add almost all the dangers of the lower operation to those of the upper. Thus, Scarpa in 1808, and Dupuytren in 1812, endeavored to reject the modifications of F. Côme, by demonstrating that the instrument contrived by this practitioner, could, if introduced into the bladder through the urethra, be made to manipulate full as well as through the perineum. Nevertheless, the process of the Feuillant ecclesiastic continued to be followed, until Home, abandoning this method, performed in two instances, in 1819 and 1820, the hypogastric operation according to the principles laid down in the dissertation of Dupuytren. Some years after M. Souberbielle himself renounced the precept of his ancestor, and which precept he had no longer followed since the year 1825; so that at the present day the question is definitively adjudged, and no longer requires discussion.

B. *Operative Process.*—The processes which have just been passed in review, notwithstanding they are different, present rules which they have in common. These rules relate either to the position of the patient, to the incision of the tissues, or to the means of passing off the urine and dressing the wound after the operation.

I. *The position of the patient* ought to be that which is recommended for the operation of hernia, with this difference only, that it would be advisable to have the pelvis slightly elevated. If the legs were allowed to hang from the table or bed, they would increase the tension of the abdominal muscles, and expose, in this manner, to a variety of inconveniences. In folding them upon the thighs as in the perineal operation, they would interfere with most of the movements of the surgeon. If necessary, the operation might be made on an ordinary bed; but a narrow table of an appropriate height renders the position of all parties infinitely more commodious.

II. *Injection of the bladder.*—When we propose to distend the bladder by means of liquids, we must begin by introducing an ordinary catheter through the urethra. The syphon of a syringe filled with tepid water is then attached to the pavillon of the catheter. The injection is to be thrown up gently, and in such manner as to make as much of it penetrate into the bladder as the patient can support without experiencing any pain. No one at the present day would think of using the urethra of an ox, the trachea of a turkey, or a leather catheter, as is recommended by Douglas, Cheselden, Middleton, and Solingen, as a medium of communication between the catheter and syringe, in order thus to prevent all kind of concussion. As soon as the injection is terminated an assistant is directed to compress the urethra, for the purpose of preventing the liquid from inaking its escape before it is time for it to do so. It is true that many persons do not need this precaution, but as it is not the same with others, prudence would not allow of our neglecting it. As to the compressor of Nuck, Winslow, &c., the fingers may be perfectly substituted for them.

III. *Incision of the external parts.*—The surgeon being placed

upon the right rather than between the legs of the patient, as M. Belmas recommends, proceeds to lay open the hypogastric wall. It would be absurd to discuss the advantage of this or that form of bistoury for this stage of the operation ; whether it be a razor, the convex or straight bistoury, or the small ordinary knife, is a matter of little importance, provided it has a good cutting edge. It is to be held in the first position, that is to say, in the manner of a table-knife, and after having stretched the parts with the left hand, we divide from above downwards, to the extent of three or four inches, first the integuments, then the cellulo-adipose tissue, and thus in this manner come down upon the aponeurosis. It is better, whatever Zang may say to the contrary, to have this incision a little too long rather than too short, and there will be an advantage, notwithstanding the contrary opinion of Winslow, in prolonging it upon the front part of the symphysis to a half an inch below the superior border of the pubes. The incision of the aponeurosis is not made in the same way by all surgeons. Though there may be some who make it with the same instrument which they have used up to this point of the operation, there are others, and Scarpa is of this number, who recommend, that after having incised into it very low down, we should glide underneath it a grooved sound which is made to pass between the peritoneum and the wall of the abdomen, from below upwards, in order that we may conduct upon it a bistoury in the same direction, to divide through the whole thickness of the *fascia*. F. Côme employs for this purpose an instrument which terminates in a triangular point at one extremity, and in a handle cut into facettes (*taillé à-pans*) at the other, and which contains a cutting blade, having a plate at its free extremity, and opens from the heel towards the point, and consequently in a direction which is the reverse of that of the concealed lithotome. This trochar is plunged in from before backwards, and from above downwards, until it arrives between the symphysis and the front part of the bladder. The surgeon with his right hand fixes its stem against the bones ; seizes its plate with the thumb and forefinger of his left hand, separates this plate from the handle from below upwards, and divides in the same direction the linea alba as well as the entire thickness of the other tissues which lie beneath its cutting edge. Having withdrawn the trochar, F. Côme introduces in its place a bistoury terminated by an olive point, with a cutting edge upon its concavity, and fixed upon its handle ; then incises from below upwards with this second instrument held in his right hand and protected or supported by the first fingers of his left hand, all the layers which may have at first escaped him, taking care to make its button point pass between the bladder or between the peritoneum itself and the deep-seated surface of the aponeuroses. At first sight, the process of F. Côme would appear to be more dangerous than any other. It is calculated to cause alarm to see the edge of his trochar bistoury acting in this manner from below upwards, and from before backwards. As it cuts however by pressing, rather than by a saw-like movement ; and as at the greatest degree possible at which it may be opened, its blade represents a line strongly oblique from the integuments towards the bladder, it rarely happens that the peri-

toneum is actually wounded. The only reasonable objection that may be made to it, is that it is not indispensable, and that any person practised in the performance of the great operations will manipulate with full as much security with an ordinary bistoury. Under this point of view the improvement which M. Belmas has made upon it, and which consists in making it concave on the back, and convex on the cutting edge, does not appear to me to possess any great advantage.

As to the probe-pointed bistoury of F. Côme, I have, while making my pupils manipulate on the dead body, a thousand times perhaps replaced it by the ordinary probe-pointed bistoury, and have never felt the necessity of employing one of a particular kind. Almost all surgeons of the present day recommend that the incision should be made directly upon the linea alba ; M. Baudens, however, recurring to the advice of certain authors, has endeavored to prove that it is better to go outside of this fibrous line, alleging that if the wound is placed between it and the inner border of the rectus muscle, we experience less difficulty in enlarging it, and in separating its lips to come down upon the front part of the bladder. This, however, is one of those recommendations which may be followed or omitted without any inconvenience. The important point is to penetrate between the two muscles, and not through their fibres. Whether the linea alba after that remains intact on one of its sides, or whether it has in reality been separated into two equal portions, is a matter that we need not trouble ourselves about. I will remark, that the reason why we ought not to make the bistoury pass through the muscular fibres, is not so much owing to the danger of incising them, as it is in consequence of the greater thickness that we should have to cut through before arriving at the sub-peritoneal cellular tissue, and because the serous membrane is found more closely applied to the deep wall of the hypogastrium, upon the outside of the median line, than it is upon the centre itself. The ordinary straight bistoury, held like a knife or pen, is full as good as any other, to incise from above downwards, and in succession, the skin, adipose layer, and aponeurosis. Having arrived to this aponeurosis, the surgeon should proceed with caution and divide it layer by layer, taking care to press with much more force while approaching the pubis than at the upper half of the wound. As we unavoidably come down upon the pubeo-vesical triangle, on the median line, and inasmuch as with a little attention we may always recognize that we have reached this point, the peritoneum does not in reality run any risk during this part of the operation. Upon the supposition that more intimate adhesions above should prevent our opening into the aponeurosis on this side to a sufficient depth, the probe-pointed bistoury should then be substituted for the straight one. Its extremity should be applied to the triangle above mentioned, immediately above the symphysis, against which the operator might for greater security hold its back supported with his right hand, while with the forefinger and thumb of his left hand, he would grasp its blade at its sides, to draw it from below upwards, and to oblige its button to glide on the anterior surface of the bladder, or the lower portion of the peritoneum itself, between those parts and the deep-seated side of the linea alba, to the extent of about two inches. It is

true that the opening into the bladder is made with less danger below than above ; but in the first case, we have to direct the cutting edge of the bistoury towards the umbilicus, which would expose to considerable risk of wounding the peritoneum ; while in the second case, if this membrane has not been wounded at first, we are almost sure of avoiding it afterwards. It is unnecessary to seek for the origin of the urachus, or the middle point which separates this cord from the pubes, as Middleton and some others have suggested. The important matter is to come down on the anterior wall of the organ, on some point which is not covered by the peritoneum, and this constitutes the whole matter. This puncture is made with a straight bistoury, guided upon the nail of the left forefinger, and inclined from above downwards, full as well as with the little concave knife of Cheselden or Rousset. In withdrawing the instrument, we should take care to enlarge the wound rapidly, in order to enable us to immediately introduce a suspensory instrument into the bladder. The forefinger turned above, in the manner of a hook, performs its office at first. If, after that, the walls of the belly should appear to be too thick, and seem to present a difficulty in reaching the bladder, we might follow the recommendation of Zang, and separate the lips of the wound apart with two small blunt hooks. The finger crooked above, again serves to direct the bistoury, which is to be had recourse to for enlarging the wound in the bladder, and prolonging it towards the neck, to the extent of an inch or more, according to the presumed volume of the calculus. In ordinary cases the same bistoury, that is to say, the straight bistoury, will also answer for this purpose, and is better even than the probe-pointed bistoury in this respect, that its point more thoroughly divides the tissues when it is withdrawn. If, however, on account of the embonpoint of the patient, its employment should be attended with any difficulty, the concave bistoury of Pott might be advantageously substituted for it, and would render wholly useless the concave bistoury proposed by the ancients. As to the scissors that are curved on their border, I know of no circumstance that can render their employment necessary. If the finger should appear to take up too much room during the time of introducing the tenacula or of extracting the calculus, or if it should be apprehended that it might be wounded during these last manipulations, an instance of which was seen by Deschamps, we ought, whether it be the finger of the operator or that of an assistant, to replace it by a special instrument for this purpose. The blunt hook of F. Côme would then answer perfectly well. The species of gorget, however, with a handle, and bent almost into a right angle near its extremity, like the one constructed by M. Belmas, would be evidently preferable. In fact this suspensory instrument, the gutter on which should face downwards, would keep the lips of the wound open, and form an excellent conductor, without in any manner moreover incommodeing either the artificial opening or the inner surface of the bladder. After this, nothing more remains than to withdraw the calculus.

IV. *The use of the director.*—When we make use of a director, it is better to adjust it before opening into the hypogastrium than afterwards ; in the first place, because its point may in some cases serve as a guide above the pubes ; and in the second place, because its in-

troduction afterwards would give greater uneasiness to the patient. We will suppose that the *sonde-à-dard* is the one to be employed. The surgeon introduces it in the manner of an ordinary sound, glides its concavity behind the symphysis, and in this manner conducts its point to above the upper strait, and opposite to the linea alba. An assistant is directed to keep it in this position, while the operator proceeds to divide the integuments and the aponeurosis. The bladder being now laid bare, the surgeon again takes the *sonde-à-dard*, withdraws it slightly in order to bring back its point again from below upwards, while grazing gently against the pubes and in such manner that the peritoneum may not form a duplicature in front of that part of the wall of the bladder which the point of the instrument is intended to make protrude through the wound. The left forefinger introduced into the bottom of the wound enables us to appreciate these movements, and points out the height to which it has arrived, and the degree of protrusion it makes. After having adjusted it in a proper manner it is again consigned to the assistant. The surgeon, who immediately pinches the salient point by the sides, then directs the assistant to push upon the dart, which he causes to emerge to the distance of one or more inches, and the point of which he unscrews if he apprehends any embarrassment from it. Without changing the position of his left hand, he takes in his right hand a bistoury which, according to Scarpa, should be convex, and on the contrary concave, according to M. Belmas, but which may be straight or the ordinary bistoury, and nevertheless have the same advantages; places its point, while holding it as a pen, upon the groove of the sound; penetrates into the bladder and divides it on the median line from above downwards and from before backwards, nearly as far as to its neck or to the prostate; then withdraws the dart into its sheath and immediately introduces the left forefinger into the bladder. The assistant now removes the sound, and if the surgeon considers it to be necessary to make use of an artificial suspensory, he attends for the moment to the adjusting of the one that he selects; takes the hook or the beak gorget in his right hand, supposing that this is the one he prefers; presents it at the wound into the bladder in the direction which is most suitable; raises it up after it has entered into this organ; glides it in the place of the forefinger, which he replaces in the lower angle of the wound, and immediately leaves the instrument in the charge of an assistant. His two hands being now free, he explores without any difficulty the interior of the bladder, and ascertains the volume as well as the position of the calculus, the extraction of which is the only thing that remains to be done to complete the operation. This extraction, which may frequently be effected by means of the forefinger curved in the manner of a hook, or by the forefinger and the thumb, or by the forefinger aided by a scoop, requires in other cases the assistance of tenacula, which are generally managed with more facility in this operation than in infra-pubic lithotomy. The precautions to be attended to in using them, moreover, are precisely the same. Only that we should observe still more caution than ever to avoid separating the bladder from the pubes and abdominal wall, and that we may not in any manner cause a laceration of the loose cellular

tissue placed between these different organs. Dzondi, (*Bull. de Fér.*, t. XXII., p. 424,) with a view to avoid making any devious track, drew through the wound by means of the sound in the bladder, a concave plate, which enabled him to extract the stone. M. Krimer, (*Journ. de Graefe et Walther*, vol. X., p. 578,) being unable to extract a calculus through the incision at the perineum, had recourse to the hypogastric operation to extract a stone twenty-three ounces in weight, and thus cured his patient. Calculi respectively of nine and a half ounces, twenty-five and a half ounces, and three pounds three ounces, are said to have been extracted in the same manner, (Pechlin and Verduc, *Thèses de Haller*, t. II., Fr. transl.) Noel thus extracted one of more than four inches in diameter, which was shown to me by M. Loze. M. Mandt, (*Kleinert's Repert.*, Janvier, 1836, p. 51,) after having extracted three calculi through the perineum, was obliged to lay open the hypogastrium to remove a fourth. In the case of M. Léonardon, the stone, which completely filled up the bladder, left behind an incrustation which had to be scraped down and removed with a scoop. M. Voisin, (*Gaz. Méd.*, 1836, p. 373,) who had incised the tissues nearly transversely, was not enabled to remove any more than the body of the stone, the head of which remained strangulated in the prostatic portion of the urethra. In another case, M. Voisin, (*Gaz. Méd.*, 1839, p. 90,) after having cut through all the tissues of the hypogastric region, and also the walls of the bladder, by means of a simple bistoury, found that the stone was expelled in some measure of its own accord, so that his patient was promptly restored. As the largest sized calculi may be extracted at the hypogastrium, and as in this region a small wound could scarcely be attended with less danger than a large one, we cannot comprehend why M. Dudon should have recommended that we ought to make use of puncture, by means of an enormous sized canula, in order to dissolve the stone in its place, nor how puncture with dilatation and lithotripsy through the wound of the hypogastrium, and which is so much eulogized by M. Franc, (*Nouv. Méth.*, &c., 1836,) could offer the slightest advantage over pure and simple lithotomy.

V. Dressing.—Supra-pubic cystotomy, different from other kinds of lithotomy, has occupied much of the attention of operators in relation to the dressing which is best adapted to it.

a. The suture of the wound was recommended at the time of Rousset, and has frequently been made use of since. It was hoped by this means to prevent the urine from passing through the hypogastrium, and of becoming infiltrated outside of the bladder. This suture, which has been more frequently advised than used, is far from having been understood in the same manner by the different authors who have ventured to recommend it. Solingen, one of its warmest partisans, does not express himself with sufficient clearness to enable us to understand positively whether he confined himself to sewing up the skin, or included at the same time the entire thickness of the lips of the wound. Others have expressed themselves more categorically on this subject. Douglas, for example, considers that the suture of the integuments would be sufficient. Rossi, on the contrary, alleges that we should especially endeavor

to suture the vesical wall itself, while Gehler maintains that the whole should be embraced in the same ligature. Monro, (J. Bell, *Traité des Plaies*, translation of Estor, p. 388,) who recommends that we should operate upon the patient under water, in order to avoid the action of the air on the bladder, also prescribes the suture with the same intention. The cases related up to the present time, whether in favor or against the suture, scarcely prove any thing. Heister, it is true, says that Praebisch, who had used it on a patient, soon saw such alarming symptoms supervene, that he was obliged to cut the points and to withdraw the threads. But how had the suture been applied? what tissues had been perforated by it? and to what degree had the coaptation been effected? We are left wholly in darkness on the subject. M. Pinel Grandchamp (*Arch. Gén. de Méd.*, t. IX., p. 612,) had recourse, in 1825, to some investigations on this subject. After having opened the bladder in a certain number of dogs, he closed it up with the suture, and the operation in these animals, it is said, succeeded sufficiently well. Since that period M. Cazenave (*Bull. Méd. de Bordeaux*, 1833, p. 82,) and M. Amussat have pronounced in its favor, and related several cases of successful results. Nevertheless, it is a resource against which both numerous and powerful objections may be adduced. In the first place, it is not probable that any body hereafter will have recourse to the suture of the integuments exclusively, nor to that of the aponeurosis or muscles. It would have the effect in fact, to close up the passage to the urine, without preventing its escape from the bladder; the result would be to force this fluid to effuse itself into the cellular tissue of the pelvis. As to the suture of the wound into the bladder, it is far from being always an easy matter. Could the urinary bladder have remained distended up to the end of the operation, if the division of its anterior wall did not extend below the upper border of the symphysis, and were the hypogastrium always found thin, we might, as I consider, hope to derive an actual advantage from it. But should the incision have been prolonged to ever so little extent towards the prostate, how can we be sure that we shall not leave any void between its lips, at its lowest portion? Afterwards, is it not to be apprehended that the points of the suture themselves may, by becoming enlarged, constitute so many passages for the urine? Ought we not also to consider as something the pain which their presence will occasion, and the protracted length which they give to the operation? The suture then could only possess some advantage in those cases in which it would be actually possible to unite the entire extent of the wound of the bladder in the most perfectly accurate manner; also, it would be necessary that the glover's suture, which is the only one which could be proposed with any apparent degree of reason, could be applied without producing too much laceration, and too much traction upon the surrounding cellular tissue. I conclude in fine, that the suture, under whatever form it may be offered, ought to be rejected in hypogastric lithotomy.

b. The indication, however, which it was proposed to carry out by means of the suture, is one of the highest importance; hence it has never ceased to be an object of enquiry. After having devised

a great number of modes, it has been supposed that a canula left to remain in the wound would be certain to conduct the urine externally. Solingen is one of the first to whom this idea suggested itself. It is not, however, very certain that the leather sound which he mentions was not introduced through the urethra, rather than through the hypogastrium; but Heuermann, a German surgeon, leaves no doubt upon the subject, for Sprengel says in express language, that he warmly eulogized the utility of a *canula inserted into the incision* after the operation. An operation performed in the month of December, 1818, at Dublin, by M. Kirby, and published in 1819, shows that this surgeon had some confidence in the practice of Heuermann. We perceive in fact, that after having terminated the high operation, he left a tube in the wound, in the same manner as M. Cazenave (*Bull. Méd. de Bordeaux*, 1833, p. 82,) states that he did also, on the 17th of August, 1827.

In France M. Amussat, who supposed himself to have been the first that made this suggestion, came out with great zeal in favor of it. The hopes that some persons had indulged in, in respect to this process, have unfortunately not been realized. M. Kirby perceived, at the expiration of four days, that the urine passed between his canula and the lips of the wound. Some operations performed by M. Amussat himself, have shown that the same thing also had happened to him. The fact is related of a patient at the Hospital St. Louis, and in whom the conducting tube did not prevent the formation of urinous abscesses, if in fact it was not the cause of them. It is a law of the organism, that when a foreign body is shut up and closely embraced within the lips of a wound, it soon enlarges its position and enables the fluid to glide over its external surface. Consequently, a canula could not prevent urinary infiltration; and as its presence could not be unattended with inconvenience, it in reality deserves the oblivion into which it has fallen.

c. Surgeons have been so reluctant to dismiss this suggestion, that they have looked for some other mode by which they might be enabled to draw off the urine externally, in proportion as it entered by the ureters. It is in this manner that M. Ségalas has proposed to insert a *meche of cotton* in a gum-elastic catheter, and leave one extremity of this meche in the interior of the bladder and the other hanging outside, in order to serve in the manner of a filter, forgetting without doubt that if the efficacy of this means were admitted, it must necessarily produce precisely the same effect when it is placed in the wound of the hypogastrium. M. Souberbielle has recommended the use of an *aspirating syphon*, composed of a large flexible catheter placed in the urethra, and a long gum-elastic tube which plunges in a vessel placed below the plane upon which the patient reposes. It was for the purpose of carrying out the same indication that M. Heurteloup contrived his *uretro-cystic tube*, which combined in some respects the apparatus of M. Souberbielle and that of M. Amussat, inasmuch as it consists of a hollow tube which issues through the wound, and of another similar tube which occupies the urethra, so that the urine would pass into the lateral openings which it meets with near the neck of the bladder, and must necessarily escape by one extremity or the other. But experience has not yet

pronounced in favor of any of these contrivances; and when we reflect upon the annoyance they occasion to the urethra, bladder and wound; and when we consider that in the horizontal position in which the patient is placed after the operation, the line of the artificial opening is sometimes less elevated than that of the urethra opposite to the suspensory ligament of the penis, it is exceedingly difficult to understand what advantages their inventors could hope to derive from them.

*d.* A circumstance which does not appear to have sufficiently attracted attention, is the cause of that almost *invincible tendency which the urine has to pass above the pubes*. At first sight it would seem that in this movement it ascends against its own law of gravitation. In examining it attentively we soon find that this is by no means the case. It rarely happens, in fact, in the hypogastric operation that the incision into the bladder does not descend as far down nearly as to the prostate, or at least to the middle of the height of the symphysis pubis. This being admitted, it is easy to convince ourselves that the urethra, when it comes out from under the pubic arcade, is elevated at least to as great a height, even when the patient is almost in a vertical position, and that in the horizontal position the urine has certainly a longer route to make to arrive at this point than to reach the lower angle of the wound. It would be time lost therefore to attempt the use of such means.

*e.* The majority of practitioners have confined themselves to the use of meches, either of linen or cotton, and one extremity of which is introduced into the bladder, that it may perform the office of a filter. Tents of lint and the dried roots of plants would be more injurious than useful. It is not even certain that the simple ravelled meche of F. Côme in reality possesses any advantages; it should not at least, if we should have recourse to it, be besmeared with oil or any kind of unctuous matter. As the blood and purulent matters with which it soon becomes impregnated almost immediately destroy its permeability, there is scarcely, in fact, any benefit to be expected from it. The only real want the operator feels is, that of preventing the parts, by their too rapid agglutination in the direction of the wound, from interposing an obstacle to the passage of the fluids which come from the direction of the bladder. Should we, during the first twenty-four hours, leave nothing between the lips of the wound, we might perhaps in this respect have some serious consequences to apprehend; but at a subsequent period, when the reuniting process has developed itself, the permeability of the tissues is so much diminished that we may leave to the care of the system everything that relates to the cicatrization and the escape of the urine.

*f.* It is not necessary for the patient, after the high operation, to remain so long a time in the same *position* as after perineal lithotomy. He may turn upon one side or the other, or sit up, and no one at the present day would recommend that he should rest constantly on his belly, as somebody advised in the last century. I will add that after the first symptoms have passed over, and that at the expiration of from five to six or eight days, should no accidents or fever have supervened, the patient may get up and soon after

walk without any danger, but on the contrary with advantage, inasmuch as the vertical or seated position unquestionably favors the passage of the urine through its natural route.

C. Accidents.—I. *Hemorrhage*, to prevent which so many precautions were adopted in perineal lithotomy, and against which the high operation was apparently calculated to protect us, has nevertheless been noticed after this last in a number of instances. Pye makes known a remarkable case, and another is found in the observations of Thornill, quoted by Middleton, then again a third in the work of M. Belmas; while I myself know that one of the patients operated upon by M. Souberbielle came near being a victim to it. M. Cazenave (*Bull. Méd. de Bordeaux*, 1833, p. 82,) was even compelled to perform hypogastric lithotomy, in order to withdraw from the bladder clots of blood which had been collected there in consequence of a simple puncture. M. Tonnellé informed me (March, 1839,) that in one of his patients, who died in this manner, it was impossible to discover the lesion of any vessel, and that the blood evidently issued by exhalation from the interior of the bladder. Up to the present time surgeons have not been enabled to specify the vessel which gives rise to this sanguineous exudation. Some have supposed that it depended upon sub-cutaneous veins or arteries that were more largely developed than usual; while others have imputed it to arterial anomalies in the substance of the linea alba, or in the *fascia propria*. Some also have conjectured sanguineous exhalations from the internal surface of the bladder. But in all these opinions there is scarcely anything at bottom but bare supposition, having a greater or less degree of probability. Anatomy, moreover, would perhaps furnish an explanation to this accident, if more attention had been manifested in practice to discover its seat. It might, for example, turn out that the arteries, which naturally mount up upon the sides of the bladder and cross each other above its neck, might constitute a noose of sufficient size to account for this hemorrhage; it might also be possible that the dorsal arteries of the penis, coming directly from the hypogastric and passing upon the sides or above the prostate, as in the cases mentioned by Burns, M. Senn, Shaw, &c., might have been divided if the incision had been prolonged very far down. However this may be, this accident is rare, and surgery possesses a number of means of triumphing over it. Should it happen during the operation itself, it might be possible, as all the parts that are divided are exposed to view, to discover the wounded artery, to seize it with a sufficiently long pair of forceps, and to twist or tie it. In the contrary case, that is to say when the hemorrhage does not take place until after the dressing, we may begin by keeping the pieces wet with cold water during the space of several hours should not the loss of blood threaten to exhaust the patient; otherwise we should have to lay bare the wound and look for the vessel. Upon the supposition that we could not reach it or discover its seat, tampons saturated with Eau de Rabel, or with some hemostatic lotion of any other description, should be inserted into the bladder. We might also introduce into this organ a large sized roll of lint, having fastened to it a long double thread destined to receive between its two heads a second tampon, upon which they are to be tied in front of

the wound, in such manner as to make sufficient compression upon the tissues from behind forwards. We ought also to have previously removed all the clots contained in the bladder, and even washed out this cavity with copious injections of water.

II. Middleton alleges that *the prostate may be wounded* when we incise too deeply, which assertion is true; and moreover, that this wound may frequently give rise to a dangerous ulcer, which, in my opinion, appears to be entirely destitute of foundation. He also speaks of injuries done to the symphysis pubis, and of the accidents which might result from them; but at the present day nobody pays any attention to these lesions, which, in fact, scarcely deserve to be mentioned.

III. *Abscesses*.—One of the accidents most to be dreaded is the formation of abscesses around the periphery of the bladder. Douglas, Cheselden, and almost all those authors who have since occupied themselves with the subject of hypogastric lithotomy, have made mention of them. There are two descriptions of these and which we must endeavor not to confound. One order arises from the infiltration of a greater or less quantity of urine between the bladder and the surrounding tissues; while the others are the pure and simple result of inflammation of the cellular tissue of the pelvis. It is readily conceived that if the operation has been attended with numerous lacerations and extensive separations, the urine will readily effuse itself into the cellular tissue instead of escaping to the exterior, and everybody knows how dangerous are those inflammations that are caused by the urine. Should there have been no *decollement* we rarely meet with these infiltrations. In fact, after a few hours, the lips of the wound have lost a considerable deal of their porosity, and the fluid passes over them without insinuating itself, as it might have been apprehended it would do, into their tissues by the force of gravitation or capillary attraction. The passage and infiltration of the urine external to the wound, does or does not take place according as the bladder in retracting does or does not bring the lips of the division into contact. This condition appears to me to embrace the whole secret of the dangers and successes of hypogastric lithotomy. Unless the reaction should be very intense, and that the parts have become very red, and that there is an acute degree of fever present with a full and strong pulse, sanguineous evacuations either by leeches or the lancet, will be rarely found of any great advantage in such cases. The urine that has penetrated by transudation into the lamellar tissue constitutes a putrescent fluid. If there be anything which can arrest its ravages, it would be scarcely any other than deep incisions, multiplied to a great extent and as speedily as possible, upon all the parts that have become infiltrated, and even upon those in the neighborhood. Unfortunately the seat of the mischief cannot always be reached by this remedy. Nevertheless, we should make these incisions penetrate in every direction where we can do so without its being attended with too much danger. The wounds are afterwards to be dressed, at least until the eliminatory inflammation is developed, by means of tincture of camphor, decoction of bark, or some solution of chlorine. Ordinary abscesses without urinous infiltration, are of more rare occurrence, and are almost

always to be imputed to the manner in which the operation has been performed. When the bladder has been opened by the sonde-à-dard or by the bistoury, the forefinger introduced into the bottom of the wound, so readily pushes it backwards in place of entering into its cavity, that it frequently happens that it completely detaches it from behind the pubes, and forms there a large pouch which necessarily becomes the source of a violent inflammation and abundant suppuration. There can be no doubt that this result has taken place in most of those cases in which the operators have alleged that the bladder was found to have been partitioned into two cavities, one anterior in which nothing was discoverable, and the other posterior, which contained the calculus. In these cases antiphlogistics are not suitable unless the patient is sufficiently strong to support them, or unless extravasation of urine be not complicated with an accident, which is in itself of so serious a character. Moreover we must give as free egress to the fluids as possible, and not have any fear of multiplying the incisions or of increasing their extent in different directions.

*IV. Lesion of the peritoneum.*—The lesion unquestionably which has been most spoken of in hypogastric lithotomy, is that of the peritoneum. Almost all authors have looked upon it as one of the most dangerous character, and some even consider it to be always fatal. Without pretending to deny its gravity, I nevertheless consider that its dangers have been singularly exaggerated. It is certainly not calculated in itself to create much apprehension ; but much rather from its enabling the urine to extravasate into the cavity of the abdomen. Now the operation is no sooner terminated than the bladder falls down, retracts, and agglomerates behind the symphysis. The wound in its walls, from that time, is no longer placed in relation with that of the serous envelope. Consequently the urine cannot in reality escape through that wound, and thus reach the abdominal cavity. What proves this however better than arguments, is the fact, that the peritoneum has been frequently wounded without the slightest accident of a serious character resulting from it, and that in patients who have died with this wound, causes sufficient to produce death have been found, which were entirely independent of it. One of the patients operated upon by Douglas, had the peritoneum laid open, but recovered notwithstanding. One of those of Thornill was equally fortunate. It is even said that in another who also got well, the intestines had escaped through the wound in such manner that they had to be reduced. The same accident happened to F. Côme and M. Souberbielle, without those surgeons appearing to have entertained much apprehension from it. A woman who was operated upon at Tours, in 1828, by M. Crozat, and who also had the peritoneum laid open to a very considerable extent, was nevertheless perfectly restored. M. Léonardon (*Observ. à l'Acad.*, 22d March, 1837) has since published another example, which is one of the most remarkable. It is said that Dupuytren was not so fortunate ; but if the account given of his operation is correct, a meche must have been introduced into the interior of the serous cavity, in place of having gone into the bladder itself ; from whence it follows that this fact does not in reality demonstrate the dangers of a wound of the

peritoneum. When it has taken place, we should, in my opinion, aggravate the danger by sewing its lips together, as recommended by MacGill, or by applying a suture to the entire extent of the solution of continuity, or at least to its upper half, as is recommended by Douglas. A meche of lint or linen, placed at the lowest part of the division, and penetrating into the interior of the bladder, is all that would in reality be proper in a case of this kind. To this we might add a strip of adhesive plaster above, and the injunction to the patient not to make any movement which would be calculated to push the viscera towards the peritoneal wound.

*D. Résumé upon the relative value of the operations for stone in man.*—A last question which remains to be examined, is that of ascertaining which method in these cases should have the preference over the others, as a general method. To solve this problem it is first necessary to take into consideration those accidents which terminate fatally to the patient after the operation of lithotomy, when the case in question is that of extracting a vesical calculus in man. Hemorrhage has, in many instances, been the cause of death; in others this result has occurred in consequence of inflammations, abscesses, and gangrene in the cellular tissue of the lower pelvis, or from peritonitis. There are some in whom a fatal issue appears to have taken place only in consequence of affections of organs more or less remote, such as cerebral or intestinal diseases with ataxic and adynamic symptoms, serous or purulent effusions into the cavities of the pleura, and especially from numerous suppurative collections in the parenchymatous organs. Besides these lesions there are others which constitute only infirmities, as for example, incontinence of urine, a wound of the rectum and urinary fistulas of every description; but peritonitis, inflammation of the cellular tissue of the pelvis, (*Arch. Gén. de Méd.*, t. II., p. 387, 2d ser.,) phlebitis or purulent infection, purulent inflammation of the ureters and kidneys, together with cystitis, are nevertheless the usual causes of death. It is true that *recto-vesical* lithotomy exposes less than any other to the danger of pelvic suppurations and metastatic abscesses; but in this we have more risk of inflammations of the bladder and intestines. It much more frequently gives place to urinary fistulas, and without allowing, as is generally believed, the extraction of large-sized calculi, with less danger than the others. *Hypogastric* lithotomy, while it is rarely accompanied with hemorrhage, is exempt from the danger of fistulas, and almost always also from that of inflammation of the bladder, incontinence of urine, intestinal inflammation, or multiplied collections of pus in the remote organs. It admits of the extraction of stones of the largest size, and is not of difficult execution, but the wound of the peritoneum is in itself exceedingly dangerous, should there supervene from it an inflammation of this membrane. It is proper to add that infiltrations and purulent and gangrenous destructions of the pelvic cellular tissue, are nowhere to be more apprehended, and that nowhere are we possessed of fewer means of avoiding them.

*Perineal* lithotomy, when it goes beyond the limits of the prostate exposes, though in a less degree, to the risk of the same infiltrations, to the wounding of the vessels of the rectum in some cases, to recto-

vesical fistulas, or to recto-urethral or urethral only, to incontinence of urine, and also to metastatic suppurations, more than the two preceding processes; which appears to me to be owing to the fact, that on one hand it more frequently involves large veins which become inflamed, and on the other gives rise to small suppurating collections, which develope themselves in the neighborhood of the wound, and the pus of which is absorbed by some means or other into the general circulation. This operation, when confined within the periphery of the gland, must, from its enabling us to avoid the arteries as well as the intestine, be but rarely followed by idiopathic or symptomatic abscesses, and has scarcely any other inconvenience than that of not making an opening sufficiently extensive for very large sized calculi; but in such cases the bilateral operation or repeated debridements after the manner of M. Vidal, present an adequate resource; while the incontinence of urine or the urethral fistulas, which might be apprehended under such circumstances, are of not sufficiently frequent occurrence, nor so difficult of cure, as to be calculated to give rise to any uneasiness; so that perineal cystotomy is still the one which possesses in reality the greatest number of advantages, and which, in the last analysis, deserves to have the preference as a general method. According to this opinion, recto-vesical lithotomy would be allowable only as an exceptional method; for example, when tumors, ulcerations, and alterations, in a word, of the perineum to a greater or less depth, do not admit of our passing through this region; or again, when the calculus is found lodged by one of its extremities in the prostate, or when this gland is diseased and ulcerated, or the seat of an excavation, which would cause an incision upon its sides to be attended with too much difficulty or danger; and finally, when the stone appears to have attenuated or ulcerated the recto-vesical septum itself. The high operation would be reserved for very large calculi and for children, and where the bladder could be distended with facility, or where the embonpoint of the patient did not render it too difficult of execution. It is, however, to be remarked that if obesity is an obstacle in the hypogastric operation, it possesses on the other hand the advantage of placing the peritoneum at a distance from the instrument by the interposition of the adipose matter which ordinarily accumulates between this membrane and the walls of the belly. Finally, those cases in which there is a horny degeneration, or thickened condition of the walls of the bladder, would also come under the class of those which belong to recto-vesical lithotomy, should it not be possible to have recourse in them to the perineal operation.

### § X.—*Lithotomy in Women.*

Women, who are much less exposed to calculous affections than men, are also much more easily cured of them by an operation. In them the urethra is straight, short and large, so that small calculi pass through it with the greatest facility, and rarely enlarge in size in the interior of the bladder. Nevertheless, they are met with in this sex, and we have recourse to the same means to get rid of them as in the other. Lithotomy in women is also performed by the high

and the low operation. If the first of these methods should require no remark, because it is subjected in every respect to the same rules as in man, it is not so with the second, where we find the recto-vesical replaced by the vagino-vesical operation, and the lateralized operation by the incision into the urethra.

A. *Examination of the methods.*—Some surgeons have alleged that all the lithotomic processes applied to man might be also employed in women; this assertion is certainly incorrect. The great operation, for example, never could be put in practice in women. The same nearly may be said of the bilateral taille, at least when applied to the lower side of the urethra. There remain then the lateralized, the little, and the vaginal processes. Calculi, moreover, of every description, have been noticed in this sex as in man. A woman who was operated upon by M. Seutin, (*Encyclogr.*, 1839, p. 157,) and who died, exhibited *debris* of a foetus in the ovary, which extended into the bladder, where was found a tooth. In the girl mentioned by M. Gendron, (*Bull. de la Fac. de Méd.*, 6th year, p. 132,) the calculus had a needle case for its nucleus; in the case related by M. Poupinel, (*Ib.*, 6th year, p. 65, and 148,) an exostosis, twenty lines long at the upper strait led to the supposition of a calculus. The needle which served as a stem to the stone, in the case related by M. Macario, traversed the uretro-vaginal septum, in such manner as to render coition exceedingly painful by the punctures which it inflicted upon the husband. The siliceous calculi noted by M. Hill, (*Gaz. Med.*, 1834, p. 135,) and M. Ségalas, evidently came from without. M. Janson and M. Castara have found some that were of very friable texture.

I. *Ancient processes.*—*Lateralized method*, or rather *lateral lithotomy*. The Greeks, Arabs, and surgeons of the middle ages, performed lateral, or lateralized lithotomy in woman in the same manner as in man. Before the knowledge of the sound, they confined themselves to making the calculus descend into the neck of the bladder, where they fixed it by means of two fingers bent into a hook, and introduced into the vagina, or if it was a virgin, into the rectum. They then cut from the skin towards the bladder, all the tissues over the stone, in an oblique direction, from above downwards, and from within outwards. F. Jacques modified this process only by making use of a sound to stretch the parts, which enabled him to dispense with looking for the stone with his fingers in the vagina or rectum. The trials made by this monk in the presence of Maréchal and Méry having demonstrated, as an accurate knowledge of the anatomical arrangement of the parts would have anticipated, that the vagina was almost constantly wounded, and that the rectum itself might be implicated, it was speedily abandoned; so that at the present day no person either recommends or practices it.

II. *Method of Celsus.*—Celsus expresses himself in so obscure a manner, or with so few details in regard to lithotomy in women, that it is quite difficult to ascertain precisely what he means by these words: *Mulieri verò inter urinæ iter et os pubis incidendum est, sic ut utroque loco plaga transversa sit.* Some persons, and M. Desruelles among others, have supposed that at the time of this author they made a transverse or semilunar incision between the meatus

urinarius and the roots of the clitoris, and that they cut down upon the stone through this, in the same way as we lay it bare in man, between the anus and the root of the scrotum. But, as has been remarked by M. Coster, it is not impossible that Celsus had in view the incision into the urethra itself, instead of that which I have just indicated. The method which consists in penetrating by the vestibulum is moreover so defective in every point of view, that it was not worth the trouble of disputing M. Lisfranc's title to it. This method, which was defended by M. Méresse at Montpellier, in 1823, and described in great detail in the Archives for the year 1824, is performed in the following manner : a sound is first introduced into the bladder in such a manner that its groove or convexity may be turned upwards and forwards, in place of resting downwards and backwards as in man. The surgeon placed in front of the perineum, makes a semi-lunar incision between the clitoris and the external orifice of the urethra ; divides in succession and layer by layer, all the tissues which separate the vestibulum from the interior of the pelvis ; arrives at the anterior surface of the bladder at the point where the urethra unites with the neck of this organ ; encounters the sound and cuts down upon its groove ; prolongs the incision upwards, by turning the cutting edge of the bistoury in this direction, and then downwards in such manner as to make a longitudinal division in the posterior portion of the urethra ; or he incises the bladder transversely to the extent of an inch or 15 lines. In whatever manner we proceed, the calculus will always be compelled by this operation, to pass through the narrowest part of the pelvic cavity. The bladder, when it is opened longitudinally, will scarcely admit of extracting from it stones which are somewhat voluminous. If we should divide it transversely, the unavoidable separation of the lips of the wound in a region surrounded with so great a quantity of cellular tissue, would not probably fail to give rise to those infiltrations, and abscesses so dangerous, which have been described in speaking of hypogastric lithotomy.

III. *Vesico-vaginal lithotomy.*—The idea of extracting vesical calculi through the vagina goes back at least as far as to the time of Rousset, since this author states that he removed 11 of them through this passage, in a woman in whom the bladder protruded at the vulva. F. de Hilden (Bonet, *Corps de Méd.*, p. 439,) followed the example of Rousset, in a case in which the vesico-vaginal septum had been partially perforated by the stone, and again in another case in which the urinary bladder had been ruptured at the time of accouchment. Ruysch also performed this operation, and extracted 42 calculi from the same woman, but it was a case in which there was an eversion of the vagina. Tolet acted in the same manner under circumstances nearly similar. In 1740 Gooch met with a female in whom the inflammation had ulcerated the vesico-vaginal septum, and which he cut into in order to extract the calculus, weighing 3 or 4 ounces. M. Faure exhibited in 1810, to the faculty of Paris, a fragment of wood which he had taken from the bladder of a young girl, by means of an incision into the vagina. M. Clémot performed vaginal lithotomy for the first time in 1814, in a patient 21 years of age, and soon after repeated it in another female. Since that period

he has had recourse to it a third time. A short time subsequently, M. Flaubert made use of the same process in order to extract a pin and needle, which had become the nucleus of a calculus, in a child 11 years of age. In 1816 he operated upon a woman 33 years of age, who had a stone of the size of a nut; and afterwards upon a woman of 40 years of age, in whom the stone was nearly the size of a billiard-ball. On the 10th of December, 1818, he operated upon a fourth woman, who was 21 years of age, and extracted a calculus of the size of a large nut. M. Philippe, of Reims, extracted through this passage, in a pregnant woman, a calculus weighing 9 ounces, which he has transmitted to me. A fistula remained behind. A large stone, having a fragment of wood 3 inches and 3 lines long, for a nucleus, was extracted in the same manner, by M. Castara, (communicated by the author, November 26, 1838,) from the bladder of a maiden, who was 45 years of age, and who recovered. The female that M. Macario (*Bull. de Fér.*, t. II., p. 262,) operated upon, and who had a calculus which had become developed upon a needle, which was in the substance of the vesico-vaginal septum, also recovered. M. Rigal (*Coze, Journ. Univers. des Sc. Méd.*, September, 1819,) also operated through the vagina, in 1814, on a woman 40 years of age, and in whom the calculus weighed two and a half ounces. The same practitioner had already performed this operation several years before, in a woman aged 38, and who had had a calculus of considerable size for the space of 8 years. Another instance has been published by M. Lavielle, (*Bull. de Fér.*, t. VIII., p. 72,) and M. Rigal, the son, has furnished another instance. So that science now possesses about 25 instances of the vagino-vesical operation, without speaking of those which Gooch ascribes to various practitioners in his country, but of which he has furnished no detail.

*B. Operative process.*—Many surgeons who have performed this operation, have omitted to mention the process which they adopted. F. de Hilden, who was the first to recommend it formally, advises that a scoop of small calibre should be introduced into the bladder, through the urethra, and that it should embrace the calculus with its concavity, and then depress it by bringing it down near the neck of the bladder; finally, that the surgeon should incise upon the projection which is thus made in the vagina, and then complete the extraction of the stone through this passage. The process of Méry, which consists in substituting the ordinary sound for the scoop (curette) of Fabricius, in such manner as to divide the vesico-vaginal septum upon the groove of that instrument, was calculated to cause the method of the Swiss practitioner to be forever rejected. This, in fact, is the process which with certain modifications modern surgeons have deemed it advisable to follow, some by associating with it a gorget to depress the posterior wall of the vagina with its outer extremity, while the other end butts against the sound, in front of the neck of the uterus; and others, like M. Flaubert, for example, in confining themselves to the introduction of the bistoury flatwise on the right forefinger, in order, afterwards to turn its cutting edge upwards, to cut the septum from before backwards, or from behind forwards, to within a greater or less distance from the meatus urinarius.

*I. Position of the patient.*—In placing the woman as for ordinary

lithotomy, we may, without any doubt, attain our object. Nevertheless it appears to me evident that if she were upon her belly, with her thighs and legs flexed, it would be still more easy to make the incisions that are necessary. The instruments required consist only of a sound, the gorget of Marchettis, a straight bistoury and the tenacula. The sound is first adjusted, with the plate raised up towards the pubes in order to depress the bas fond of the bladder upon the median line. An assistant is charged with keeping it in this position. The gorget having been introduced to the bottom of the vagina, is then given in charge of a second assistant, who depresses its handle, while taking care that its other extremity serves as a point d'appui to the sound, and that its groove looks upwards and forwards if the woman is placed on her back; and downwards and backwards on the contrary, if she is on her belly. The surgeon separates the labia majora with the thumb and first fingers of his left hand; seizes the bistoury in the manner of a writing pen and directs its point behind the urethra, that is to say, to an inch at least in depth into the vagina; inserts it into the groove of the sound, then makes it glide along this instrument to the distance of eight or ten lines, or more if it is necessary, and terminates by depressing it a little in order to make it fall into the groove of the gorget. We might also hold the bistoury in the second position, that is to say, with the handle in the hollow of the hand and the cutting edge turned towards the bladder, in such manner as to introduce its point to the depth that may be required, and to divide the septum from behind forwards, and always upon the groove of the sound. These two methods differ so little as to their ultimate result, and even in respect to the facility of the manipulation, that we must leave the preference to be given to one over the other, to the choice of the operator. There is no doubt also that the surgeon might himself hold the sound with his left hand, while with his right he incises in the manner that M. Flaubert operated; or as M. Clémot recommends, he may on the contrary seize the gorget in order not to be interrupted by the assistant at the time of making the division of the septum. We might also, if necessary, dispense with the gorget by adopting the course of the surgeon of Rouen; that is, introduce the bistoury protected by the palmar surface of the forefinger, into the interior of the vagina, in order to make the opening into the bladder without having need of any other assistance than such as would keep the patient steady; but it cannot be denied that the operator, with his two hands free, is more at his ease to make the principal incision, and that the gorget possesses the advantage of stretching and exposing the parts which are to be divided; only that it would be advisable that this instrument should have a handle which is bent into an angle, and that its groove should terminate without any cul de sac.

II. The incision, if commenced at some lines behind the meatus urinarius, in such manner as to include a greater or less extent of the lower wall of the urethra, as in the process followed by M. Flaubert, would, in the first place, have the inconvenience of not favoring in any respect the extraction of the calculus, and in the second place, of rendering the cicatrization of the wound more tedious and diffi-

cult. It is better therefore to imitate MM. Clémot, Rigal, &c., and to commence only at the point of the trigonus vesicalis, if we incise from before backwards, or to terminate there in case we should prefer to make the incision from behind forwards. As the vagina has a length of from three to four inches, there will still remain, when we adopt this process, an extent of over an inch, which may be divided without danger. Moreover as the tissues possess so great a degree of distensibility, it is unnecessary to give a greater extent to the opening than appears to be required by the supposed volume of the calculus. M. Faure, the oculist, (*Observ. sur l'Iris, &c.*, p. 60, 1820,) who recommends that we should traverse the vesico-vaginal septum by a very oblique incision from before backwards, states that he cured in this manner, in 1808, a young girl without any fistula ensuing.

III. *Extraction of the Stone.*—The incision having been made, the sound is to be withdrawn. If the calculus does not present itself of its own accord in the wound ; or if it does not fall spontaneously into the vagina as has sometimes happened, the operator proceeds immediately to search for its situation and relative position by means of the left forefinger ; he then extracts the calculus by means of suitable tenacula, regulating his course by the rules above laid down. When the stone is of large size or when we operate on a young girl, this extraction may, in consequence of the narrowness of the vagina, be attended with some difficulty. M. Flaubert, in a case of this kind, was obliged to break up the foreign body and remove it in fragments. Nevertheless, as the canal which is to be passed through is exceedingly dilatable, it is scarcely to be conceived that it would present an insurmountable obstacle to the termination of the cystotomy.

IV. The stone being once removed, the woman is to be replaced in bed and submitted to the same attentions that are required by the usual sequelæ of lithotomy. These sequelæ in the vagino-vesical method are generally of a very simple character ; up to the present time there is no case related in which they have resulted in death. In most cases scarcely any fever supervenes. No large-sized artery can be wounded. The peritoneum is too far off to run the slightest risk, and the cellular tissue of the septum is too dense to admit of the possibility of a urinous infiltration. But the wound does not always cicatrize agreeably to the expectations of the patient and operator. Its position alone, must have already led to the presumption that in many cases it would be transformed into a fistula, and experience has unfortunately confirmed this anticipation ; without counting that it might well have occurred in some of the patients who were first operated upon, though no mention may have been made of it by the surgeons. It is at least certain that out of three cases of M. Clémot, he has found one followed by a fistula ; that three of the patients treated by M. Flaubert were affected in this manner ; and that those related by M. Rigal the son (*Rev. Méd.*, 1831, t. I., p. 489,) and M. Philippe, were not more fortunate ; from whence it follows that this accident is met with in at least one case out of four. M. Coste supposes that it might be prevented by reuniting the wound by suture immediately after the extraction of the calculus ; but vaginal cystotomy would then become an exceedingly tedious operation. There is also reason to doubt, after the trials of this kind in cases of

ordinary vesico-vaginal fistulas, notwithstanding the fortunate result of M. Coley. (*L'Exper.*, t. III., 1839,) if we should by this means be enabled to obtain the success which M. Coste appears to anticipate.

C. *Urethral Methods.*—For a long time perineal lithotomy in women has been almost exclusively performed by making an incision into the urethra; this canal, however, is so dilatable that a long while ago the idea was suggested that we should extract the calculi without making any kind of incision. Bartholin speaks of a woman who expelled one which had a diameter of over two inches; Borelli cites another in whom was as large as the finger; and Middleton relates that a woman, during a paroxysm of coughing expelled one which weighed four ounces. Heister has collected examples of the same kind, in which it may be seen that calculi as large as a nut or even a pullet's egg have been ejected through this passage; F. Collot mentions one of the size of a goose egg, and which had caused ischuria for the space of eight days before it was expelled; Molyneux (*Transact. Phil.-Chir.*, vol. IV., p. 227) states that he has seen another which weighed two and a half ounces; while the one mentioned by M. Yellowly weighed more than three ounces. We find in Planque, (*Bibl. de Méd.*, t. IX., p. 467, in 4to,) instances of calculi of still larger size that were expelled in the same manner. Kerkringius, Morand and Grunewald, and scientific collections both ancient and modern, relate cases which are no less extraordinary. The one which M. Ségalas has exhibited, (*Rev. Méd.*, 1836, t. II., p. 279,) had no less than an inch in its smallest diameter, and M. Simon, (*Ibid.*, 1826, t. I., p. 133—*Journ. de Graefe und Walther*, t. VI., p. 163.) has mentioned one which was two and a quarter inches in length and one inch in breadth. A woman that fell under the notice of M. Harris, (*Gaz. Méd.*, 1838, p. 744,) expelled a calculus which was two and a half inches long, by one in breadth, and weighed 651 grains. Though some of these calculi may have been expelled from the uterus and vagina instead of having been formed in the bladder, it is nevertheless indisputable that many of them have in reality come through the urethra, and that in certain cases this enormous dilatation has not been followed by incontinence of urine.

I. *The method by dilatation*, which grew out of these facts, is performed in two principal modes: in one we proceed rapidly by means of metallic instruments; in the other, on the contrary, we act with extreme caution, and by means of permeable substances temporarily retained in the passage. Tolet is the author of the first method and Douglas of the second.

a. *Sudden dilatation.*—The process of Tolet consists in introducing into the bladder the dilating instruments of the great operation, and in moderately separating their branches until we are enabled to pass the fingers and tenacula between them, in order to reach the calculus. Since that period the ancient dilating instruments have been replaced by the following process. A grooved sound serves as a conductor to a gorget which is narrow in its anterior portion, and which widens rapidly towards the handle. By means of this gorget the fore or little finger of one of the hands afterwards dilates the urethra from before backwards, in order to make a passage for the tenacula; but in whatever way we effect this dilatation, it is a painful

operation, and so much so that many women are utterly unable to support it; it is moreover frequently followed by incontinence of urine, laceration of the urethra, &c.

*b. Gentle dilatation.*—Douglas supposed that he could remedy the inconveniences of sudden dilatation, as proposed by Tolet, in operating by means of a tent which was made of sponge or of dried gentian root. This is the way in which those practitioners still proceed, who suppose that they can dispense with an incision into the urethra. The little cylinder of the cœcal appendix introduced empty into the bladder, and then filled with water, and brought out from behind forwards, as proposed by Bromfield, the dilator of the same description contrived by Arnault, and the little speculum of Weiss, (*Bull. de Fér.* t. I., p. 82,) are no better, while the sponge in fact has this advantage, that it enables us to introduce through its centre a catheter which allows the urine to escape, should we propose to leave the dilator in its place for a long time. We should be wrong, however, after all in supposing that this kind of dilatation is much less painful than the other, and that it protects us better from the dangers of incontinence of urine and the different accidents which that is considered chargeable with. It is certain that a pure and simple incision, as it is performed at the present day, does not involve any greater danger, that it causes less suffering, and that it enables us to afford more prompt relief to the patient; so that dilatation, whether gentle or sudden, is not in reality adapted but to those calculi whose greatest diameter does not exceed five or six lines.

*II. Uretrotomy.*—The uretral incision may, if necessary, be performed on any part of the two upper thirds of the circumference of the canal.

*a. Fleurant* has proposed to divide the urethra on both sides at the same time, by means of a double lithotome, introduced shut up, and drawn out open, and to commence the incision at the neck of the bladder and terminate it at the meatus urinarius. Louis, who adopts the same principle, recommends that we should incise from before backwards. For that purpose he had contrived a flattened sheath which was open on its sides, and in which he plunged from without inwards a blade with a double cutting edge. Le Blanc, to whom he communicated his invention, remarked to him that an instrument which had a cutting edge on one side only, and a sheath which was open in that direction only, would answer the purpose. But the processes which have been based upon such instruments have at the present day completely fallen into disuse, and uretral taille no longer requires for its execution any other than a straight bistoury and grooved sound, or the lithotome of F. Côme; unless we should desire to revive the process of Fleurant, in which case the double lithotome of Dupuytren would obtain a new application.

*b.* The most ancient process and the one which has been the longest followed, is that which consists in introducing into the bladder a grooved sound, to serve as a guide to a long straight bistoury, by means of which we divide obliquely from above downwards, and from the right to the left, through the whole extent of the urethra. But this method, which M. Klein, (*Rust's Handb. der Chir.*, vol. II., p. 177,) calls *cystenchenotomy*, one which F. Côme and Dupuytren

have rendered still more simple by making use of the concealed lithotome in place of the bistoury and sound, and which Kern (*Ibid.*, vol. II., p. 183.) performed with a male catheter, the groove upon which he turned to the left and downwards, was frequently followed by a wound of the vagina, and moreover, if the incision was carried a little too far, exposed to the risk of dividing the superficial vessels of the perineum, and even the pudic artery itself. MM. Scheuring and Schroeger, (*Ibid.*, vol. II., p. 181,) who, in operating also with the grooved sound and bistoury, made their incision transversely, have in this matter added nothing useful to this process.

c. *Process of Collot.*—This operative process, therefore, has been generally abandoned, since it has become the practice to incise the urethra directly upwards. The origin of this last process, which is ascribed to A. Dubois, goes back as far at least as to the sixteenth century. It is to Collot to whom Paré, after having given the figure of a grooved sound, ascribes the honor of this process : “Other practitioners,” says he, “operate in another manner, as I have frequently seen done by Master Laurent Collot ; it is this, that they in nowise place their fingers within the seat, nor within the neck of the uterus, but content themselves with inserting the conductors into the urinary passage, and then afterwards make a small incision *altogether above, and in a straight line from the orifice of the neck of the bladder, and not upon one side,* as is done in males.” At the present day this operation, after the modification under which it has been revived by Dubois, is performed in the same way as the preceding, by means of the sound and bistoury, or with the concealed lithotome. In the first case, we introduce a large sound terminated in a cul de sac, and with its groove turned upwards. The surgeon holds the instrument at its plate with his left hand, and by means of this depresses the front part of the vagina with a certain degree of force. With the right hand he conducts upon it a narrow and very sharp bistoury, by means of which he incises the upper wall of the urethra throughout its whole extent, together with the surrounding tissues, as high up as to the infra-pubic ligament. By this means we obtain an opening of from 6 to 8 lines, which is sometimes increased from 8 to 10 at the moment of making tractions upon the stone. Nevertheless it would be dangerous to attempt to extract through a passage of this kind a calculus of over an inch or 15 lines in diameter. I have seen M. Bougon remove one of this size in a young woman who recovered perfectly, and M. Thomas of Tours was no less fortunate in a similar case. The one mentioned by M. Castara, (letter of the 19th March, 1839,) was as large as an egg, but it was crushed by the simple pressure made upon the tenacula. It is important when we withdraw the tenacula to rest them with a certain degree of force against the lower plane of the urethra, and raise up their handles in such manner that they may act in the direction of the axis of the lower strait. Otherwise the calculus and the instrument would butt against the symphysis, and the surgeon would in this manner surround himself with serious difficulties, and at the same time would expose the woman to dangerous contusions. A good operator in one of the hospitals of Paris in 1824, was for a long time embarrassed by this obstacle, though the calculus, which was extracted with

extreme facility by changing the direction of the tenacula, was no larger than a partridge egg ! In certain cases also the calculus may be extracted with so much facility that a simple dressing forceps will answer the purpose. M. Gaspard, (*Bull. Méd. de Bordeaux*, 1833, p. 171,) while in a remote part of the country, and without any assistant or special instruments at command, succeeded by this means after having incised the urethra with a bistoury guided upon a grooved sound.

B. *Appreciation.*—It is perceived from the above facts that no kind of perineal lithotomy will allow of the extraction of large stones in women. The lateral or even the lateralized incision itself, would not, under such circumstances, be of any great advantage. As the superior incision is located at the top of the arcade, it can necessarily furnish us with but a very limited opening. The bilateral incision would present more advantages ; but experience has not yet shown that it could be performed with any positive prospect of success, and reasoning induces us to apprehend that the urethra divided in this manner into two halves, might allow of dangerous urinous infiltrations, or give rise to an incurable incontinence of urine. Nevertheless, I am of opinion with Dupuytren, that it would be advisable to re-examine this question and to decide upon it by the evidence of facts. If now we should take into consideration that in the feminine sex, lithotomy is in the majority of cases requisite for calculi of a large size, we shall find ourselves immediately reduced to the necessity of making choice between the vaginal and the hypogastric operation. The fistulas which too frequently follow after the first, constitute an infirmity which is so disgusting, and so often incurable, that we would rarely decide upon performing it, without being very certain that it was not possible to succeed in any other manner. Now the second, all other things being considered, being more easy, in consequence of the less considerable height of the pubes, and the more marked projection of the bladder above the pelvic cavity, and having at every epoch been considered less dangerous than in man, ought in my opinion to be preferred in all those cases where the urinary organ retains a certain degree of dilatability ; so much the more so, inasmuch as those calculi which it would be found impossible to extract by the incisions into the urethra, would require in the vesico-vaginal septum too great an opening to exempt us from the danger of producing a fistula in that region. In conclusion, dilatation in my view appears to be adapted to small calculi ; the upper incision to those which do not exceed the size of a small egg ; while the oblique incision should be made trial of in those cases only where the stone is a little larger, or where the vagina is not sufficiently dilated to make it almost impossible to avoid its lesion. While vaginal lithotomy would be adapted only to those calculi which were as large as a pullet's, or at most, a turkey's egg, upon the supposition that we were not disposed upon any account to resort to the hypogastric operation, which nevertheless is the only one that in reality could be adopted where the stone is still more voluminous.

## ARTICLE IV.—LITHOTRITY.

Lithotomy, notwithstanding the improvements which it has undergone, is still of so dangerous a character that efforts are constantly being made, to get rid of the necessity of it, and to substitute for it a less painful operation. Many persons conceive that this result, which is so desirable, has been achieved by modern surgery; and that by means of lithotripsy, we shall henceforward have it in our power to dispense with the operation of lithotomy, at least in an immense majority of cases. We shall see farther on what foundation there may be for anticipations of this kind. Lithotripsy, or the crushing of the stone, consists in the *breaking up* of the calculi *into fragments*, (*le morcellement*,) and their extraction afterwards through the natural passages by means of special instruments. It comprehends in its largest acceptation the pure and simple *extraction*, *crushing*, *pulverization*, *breaking up*, *perforation*, and *trituration* of calculi in the interior of the urinary bladder itself, or of the urethra. The designations of *lithopryny*, *lithodialysis*, *lithotripsy*, and *lithocenosis*, which it has been proposed to substitute for the term *lithotripsy*, being no more free from objections than this last, do not deserve the preference which has been contended for by those who have proposed them. The idea of extracting calculi entire, or after having broken them up, and without incising into the organs, is far from being new. It has attracted attention at every epoch, at least for those calculi which are lodged in the urethra. It also sometimes happens that the stone crumbles to pieces of itself in the interior of the bladder. A patient mentioned by M. J. Harding, (*Gaz. Med.*, 1838, p. 777,) and who died at the age of 81 years, without having undergone an operation, had 50 calculous fragments resulting from the spontaneous disintegration of a stone in the bladder. A fact almost in every respect similar was seen by M. Ségalas, and published by him. I saw a case somewhat analogous in 1836, at the hospital of La Charité. Albucasis had already made mention of an instrument which would enable us to seize calculi at the remote portion of the urethra; the sheath forceps, with three or four branches, as described and figured in the Bibliothèque of Manget, under the name of Asta, appeared to F. de Hilden, to be calculated to effect the same result. A tube with three elastic branches was made use of for the same purpose by Sanctorius. Franco had contrived for this object a *vesical quadruple*, and Paré a kind of augur or turrell, which he conducted upon the calculus through a canula. F. de Hilden used a forceps with three branches, which was so constructed as to crush the stone after having embraced it. However, though it may have appeared to almost all authors to be practicable to seize small calculi, and to perforate and break them up, in the urethra, it is by no means as clearly demonstrated that their instruments were ever introduced farther than this point, to carry out the same indication. Nevertheless, an Arabic author, who is evidently no other than Albucasis, says, in a work in which he is spoken of under the name of Alsaharavius, or Acaravius, (*Liber Theor. nec non Pract.*, 1519,) that we must "cautiously introduce into the bladder a fine (subtil) instrument, called *Maschabarebilia*, in order to seize

the stone and to crush it if it is soft, and then to extract it." Alexander Benoît also remarks, that we may crush the calculus by means of metallic instruments, and without making any wound in the organs; it appears finally that Sanctorius, (Haller, *Bibl. Chir.*, t. I., p. 213.) Franco, and F. de Hilden, also went so far as to look for small calculi in the urinary bladder itself; but the few facts furnished by these authors are too vague to have any great weight in this question. I might say the same of Aretino, (*Strangalament. Uter. Post.*, &c.) who, in his posthumous surgery, speaks of a forceps with three branches, designed for extracting gravel from the urethra and bladder. In the last century, Hoin related the history of a monk of Citeaux, who, by means of a flexible sound, and a steel stem terminating in a bevelled edge, had succeeded in breaking up a stone in himself, by striking upon it small strokes with a mallet, in the same manner as upon the chisel of a statuary. The journals of Calcutta, and afterwards Marcket, (*on Calculous Disorders*, &c., p. 20,) have made known an experiment which is more conclusive, viz., that of Major Martin, who succeeded upon himself in reducing a stone into powder, by means of a file which he introduced into the bladder through a curved sound; which did not prevent him, it is said, from dying of stone in 1800. As with M. Civiale, so with me, it has been impossible to find the work of D. Marco, published at Venice in 1799, and entitled *A New Manner of Dividing the Stone in the Bladder*, &c. Though the forceps of Hales, called Hunter's, enabled Desault to bring to the outside very small vesical calculi, and though M. A. Cooper, who has modified it, has extracted with it in this manner in a chimney sweeper near 80 calculi from the bladder; all this nevertheless did not by any means constitute a method; nor did the breaking up of the calculi, by making percussion upon them with a sound, as recommended by Thomassin, or with a catheter, according to the manner of Rodriguez, furnish anything very conclusive, notwithstanding the much better systematized experiments made by M. Gruthuisen and M. Eldgerton, which last also with the intention of breaking up the stone in the interior of the bladder, likewise made use of a curved catheter, (sonde,) in which he introduced a grater (râpe) in order to break down the calculus by a movement *backwards and forwards*, (*va et vient.*) Nevertheless, the project of M. Gruthuisen though not used in practice, and perhaps not practicable, went farther than any other. This surgeon has delineated numerous instruments, and made repeated experiments, and demonstrated that we may introduce into the urethra straight canulas of from four to five and six lines in diameter. Though his principal object was to dissolve the vesical concretions by means of the galvanic pile, he nevertheless contrived an apparatus to break them up; which apparatus is composed of a straight canula, a noose of brass wire which opens at its extremity in the bladder, and of a perforator which may protrude from it and re-enter at pleasure. The trials of M. Gruthuisen, however, had like the others passed into oblivion, when several of our countrymen, feeling the same want of an operation of this kind, exerted themselves to give a permanent foundation to lithotomy. M. Civiale, who, in the year 1818, endeavored to discover a means of dissolving stones in the bladder, and had already conceived the idea of certain instru-

ments by which they could be grasped and broken up, maintains that those which he now employs were invented by him. M. Leroy, on the contrary, alleges that M. Civiale had not at that time devised any but unsuitable instruments, and that the forceps with three elastic branches, and which is nothing more than a modification of the forceps of Sanctorius or the ball extractor of Alphonse Feri, were unknown to him. I remember, in fact, that M. Leroy showed me this forceps, the same as that which he still uses, before presenting it to the Academy, in April, 1823; and that that which is found in the first work of M. Civiale, published in the course of the same year, is very different from it, and is much more analogous to the vesical quadruple of Franco. It is however a difficult matter to come to a decision on this point; Percy, in his report to the Academy of Sciences in 1824, declared himself wholly in favor of M. Civiale; while in 1825, 1828 and 1831, the same learned body recompensed M. Leroy, for having invented the principal instruments, and among others the forceps with three branches. A review, however, of the different processes now in use, and of the various instruments which have been employed up to the present time, will oblige us to return to these questions, and will place us in a condition to form a more correct judgment in respect to them.

### § I.—*Examination of the Methods.*

Lithotripsy comprises two methods, which are sufficiently distinct in respect to the instrumental apparatus used; in one straight instruments are employed; while in the other, on the contrary, the instruments are curved.

A. *Rectilinear method.*—One of the difficulties which for a long time embarrassed practitioners, was that of penetrating into the bladder with straight instruments, so much so that lithotripsy actually *dates its existence* from the time at which practitioners ascertained the practicability of rectilinear catheterism. As the *straight catheter (sonde)* has thus become a principal instrument, we cannot be surprised at the importance which has been attached by some persons to its invention. But upon this point, as in almost all those questions which relate to the great operations in surgery, we have only gradually arrived at the realization of the fact, while the actual discovery is found to be separated by a very considerable distance from the demonstration of its utility. Though it may not be proved that Albucasis or Sanctorius, or any other ancient author had conceived the idea of straight instruments for penetrating into the bladder; though it might be allowable to call in question the fact, that the straight instruments found in the diggings of Herculaneum, by E. Clark, or in the Officinum of a surgeon of Portici, were ever made use of for catheterism; or though it should be incorrect to say the Rameau had proposed sounds that should be *altogether straight*, it is at least indisputable that Lieutaud did formally make this suggestion, and that his proposition was far from having been forgotten. We find it in fact reproduced in the Elements of Surgery published by Portal, in 1768, and afterwards in the Dictionary of Surgery edited by Louis. In 1795, Santarelli, a surgeon of Rome, returning to this question, en-

deavored to prove that the urethra has no curvature in its prostatic portion, and that we may, by depressing the penis, easily overcome that which is noticed under the symphysis. Lassus held the same language in his course, at the school of medicine, and M. Montagut positively maintained, in 1810, that rectilinear catheterism, in a considerable number of cases, is an operation as easy as it is advantageous. Another French physician, M. Fournier of Lempdes, who was investigating the subject of lithontriptic processes, in the year 1812, made use of the straight sound. Authentic certificates collected by him, leave scarcely any doubt upon this subject. The work which was published in 1813 by M. Gruthuisen, finally appeared and revealed the most important proof; so that though we attach no importance to the assertion of several military surgeons, and MM. Larrey and Ribes among others, who state that they have frequently used the straight catheter in the army campaigns, it would still be impossible to ascribe wholly to our epoch the invention of catheterism by instruments devoid of curvature, an invention which M. Moulin also in his turn presented a claim to in 1829. Habit, however, and prejudices succeeded in predominating, and for so much the greater reason, because the straight catheter, as an instrument for penetrating into the bladder, and for giving egress to the urine, is incontestably less convenient than the curved. It became necessary that this kind of catheterism should present itself under another point of view, to enable it to take rank in surgical practice. From 1815 to 1823 several surgeons, feeling more sensibly than ever the necessity of discovering some means by which calculi could be destroyed without a bloody operation, exerted themselves to obtain this result by investigations, which were undertaken about the same time, in similar directions, or by different processes. While these events were transpiring, the practicability of traversing the urethra by means of canulas without any curvature, was again announced. Though M. Amussat, in order to prove this, supported himself principally upon an anatomical error, he, nevertheless, ultimately succeeded in awakening the attention of surgeons upon this subject. While he was in vain endeavoring to demonstrate how much deception had existed in relation to the direction of the excretory duct of the urine, MM. Leroy and Civiale availed themselves of this practical fact, which immediately became for them a matter of high importance. Up to that time it would appear in fact, that they had had no idea of the straight sound for the purpose of breaking up calculi; while the instruments that M. Leroy in particular made use of, were still curved. The observations of Lieutaud, Santarelli and M. Montagut, and also the work of M. Gruthuisen, which might have been of such great assistance to them, had evidently escaped their attention. We may, therefore, assert with every degree of confidence, that it was from this epoch only that lithotripsy dates its existence. From that time the breaking up of the stone has been performed by so many different processes, that it becomes necessary that we should enter into a succinct review of them. In one, and which was the first that was made trial of on living man at Paris, nothing more was done than to pierce the calculus in various directions, and afterwards to reduce it into fragments, in order to perforate them and break them up in suc-

cession, and then to extract them by piecemeal, should the bladder itself not succeed in expelling them with the urine. In another process simple perforations were not the only means made use of. The surgeon endeavored by means of particular kinds of instruments, to hollow out the calculus from its centre to its circumference, in order to transform it into a sort of shell, which was afterwards broken up and reduced into fragments, as in the preceding process. In a third process the instrument acted upon the stone, from the circumference to the centre, and its effect is to pulverize it by means of an actual concentric crushing. A fourth process consisted of an effort to *crunch* (*gruger*) and crush the stones without previously perforating them, and this either from the centre to the circumference or from before backwards. Another process had for its object to crush and *break up* (*casser*) the stone. It was also proposed to split it up from the centre, (*faire eclater par le centre*.)

I. *Perforation*, which was the method adopted in the beginning by M. Civiale, is the same which this lithotritist still eulogized in 1838. The instruments which it requires are: 1st. A large canula of from two to four lines in diameter and from nine to twelve inches in length, and which serves in some respects as a sheath to the other instruments; 2nd. A forceps or *litholabe* destined to seize and to hold the calculus; 3d. A drill, either cylindrical and with a triple or quadruple point, or with a head and in shape of a trephine; 4th. Auxiliary instruments, such as a winch, rings, racks, a mandril lathe, and the vice, &c., which serve to support the principal instruments outside, and to make them manipulate in the interior of the bladder.

a. *The chemise or outer canula*, after being once introduced into the urethra, is to remain there and to serve to protect it. As it must be adapted to this canal, its dimensions are to be increased or diminished, according to the age of the patient and the peculiar anatomical relations of the parts. It is necessary that its walls, with as little degree of thickness as possible, should also possess a great degree of resistance, at least at its vesical extremity. Its outer extremity is generally provided with a box (boite) of leather or cork, and cut into four facettes (pans) to the extent of an inch or two, in order that it may be embraced by the mandril lathe or vice.

b. The *litholabe* is one of the articles which has undergone the greatest modification; it is unnecessary to speak in this respect of M. Civiale's first instrument, which resembled the vesical quadruple of Franco, or of that which M. Leroy proposed in 1822, and which is composed of four watch-springs, which form when they open a double crossed noose in the bladder, since these instruments have not been adopted by any body, not even by their inventors, and that the one made by M. Luckens, a cutler of Philadelphia, upon the same principle, is no better. M. Colombe proposes a litholabe composed of two concentric canulas, each of which is terminated by two elastic branches united at their extremity, and which may be crossed at a right angle around the stone when this latter has been grasped. This instrument, which is evidently constructed upon the same idea as the litholabe of M. Leroy or that of M. Luckens, will have the same fate as the preceding ones.

c. It is the forceps, properly so called, which, up to the present time, has been generally relied upon. This forceps, which is a simple modification of the *trifide* canula of Sanctorius or F. de Hilden, and of the ball extractor of A. Ferri or André de la Croix, is also the one the authorship of which has given rise to the greatest contention. Three elastic branches, curved in the form of a hook, and lapping over in such manner that they may be closed up and reduced to the size of the principal stem in bringing them into their sheath, terminate its vesical extremity, while the other has a leather cap, but without any pressure screw, like that of the first canula.

d. The litholabe, such as I have just described it, has not met with the sanction of all lithotritists. Many of them have specially endeavored to increase the number of its branches. Some have given it four, M. Amussat proposed five, and Meirieu (*Bull. de Fér.*, t. VII., p. 360—t. XII., p. 240) had divided it into twelve. M. Tanchou (*Ibid.*, t. XIX., p. 72) recommends ten. That of M. Récamier is composed of two canulas which each contain five branches, and which, by turning upon each other, soon form a forceps with from five to ten branches. These various modifications have been contrived for the common object of retaining the calculus with greater facility as soon as it has been grasped, and also of not allowing its principal fragiments to make their escape from the instrument.

e. The *lithomyleur* of Meirieu, successively improved by MM. Récamier and Tanchou, is also distinguished from the others in this particular, that the free extremity of all its branches is pierced with an eye for the passage of a very strong silk cord, intended to approximate them and to prevent their separation, in the same way as the cord of a purse, and which, in order to come to the outside, is made to pass between the two canulas in a special groove for that purpose. That of M. Récamier moreover may, by the rotation of the two canulas, present on one of its sides a large opening to the calculus, and then close itself up around the foreign body. In the apparatus of Meirieu and M. Tanchou, we again find the same precaution, but under another form, that is to say, that one of the branches of the forceps which has remained in the canula, leaves a lateral opening for the entrance of the stone, and may be afterwards brought to a line with the other branches by means of tractions made upon the silk cord.

f. M. Ashmead, of the United States, has presented one to the Academy which has four divisions, three of which are quite approximated together, while the fourth is considerably separated from them. By means of this arrangement, the forceps leaves on one side all the interval required for grasping the largest sized stones, and on the other represents a sufficiently close grillage, which is to be turned downwards at the time of breaking up the stone, in order not to allow of the escape of those fragiments which are of considerable size. It would be better without doubt, if we could be enabled to keep the calculus shut up until it was completely destroyed; but the instruments proposed do not procure this advantage but at the expense of several others. In multiplying the branches they are necessarily weakened. As the calculi are far from always having a regular form, or being constantly so situated that they may be seized by the for-

ceps centre to centre, there would be reason to apprehend that one of its numerous branches might be placed under the necessity of sustaining the whole effort, and consequently that it might slip or be broken. If, as in the apparatus of Meirieu, its extremities are united by a silk cord, the accident doubtless is less to be apprehended, while the little cage (*cage*) presents a much greater degree of regularity; but might not the silken thread break, and might it not become entangled in the branches of the instrument itself? Are we always very sure of being enabled to make it work freely? Moreover, when the litholabe is once shut, how could we disengage the stone from it, if the bladder should be emptied and had contracted violently? If the forceps with three branches could not fulfil our intentions, that of M. Ashmead, which while it possesses sufficient force, enables us to have a grillage closer than the common forceps, might of itself, as I conceive, be substituted for it, at least in the process of simple perforation. The eel-skin bladder connected by M. Deleau with one of these lithotritors, would not improve them any, even though we should attach this pouch to the extremity of a straight catheter, in order to inject into it diluted hydrochloric acid, for the purpose of dissolving the calculus, as recommended by M. Zaviziano, (*Mem. de l'Acad. Med. Chir. de Naples*, 1831.)

g. *Lithotritors*.—A steel rod, the vesical extremity of which only can be susceptible of important modifications, is charged with the office of acting on the stone. In the first instruments used by M. Leroy, this stem was cylindrical, and terminated in points. In the instruments of M. Gruthuisen, there is one which is armed with a head similar to the crown of a trephine. This last is the one that M. Civiale has preferred. It results from this, that his lithotritor must be introduced at the internal extremity of the forceps, and that it can only be withdrawn with the whole of the instrument, while the cylindrical drill penetrates and comes out by the outer extremity. On the other hand, these drills with a head evidently make a more considerable perforation than the others. M. Civiale, in order to obtain a still greater opening, has had some constructed which are eccentric, that is to say, having their axis outside the axis of the stem. The advantages of the drill are, that it presents a great degree of solidity, acts with force and certainty, and does not expose to any serious accident. The actual objection which is made to it, is that of giving us an opening only of three to four lines, that of requiring us frequently to change the position of the calculus, and of repeating the operations, should the stone be somewhat large.

h. *Opening drills*, (*Forets à développement*).—Struck with the above mentioned imperfection, several surgeons immediately undertook to find a remedy for it. M. Leroy, who was one of the first, had constructed countersink drills (*forets à fraise*) and opening lances (*lances à développement*). A drill cleft at its extremity first enabled him to make a perforation, and afterwards to enlarge it, because in pushing the fraise out of its canula its two branches opened from it forcibly in consequence of their natural elasticity. Another instrument of the same character, appeared to him to be calculated to attain the object still better. Its two branches separate apart, from the head of the drill, by retracting upon themselves. Finally, M. Leroy con-

stantly following out the same idea, has employed with success a cylindrical stem enclosing a fraise with a double blade, which may escape from it when we push upon it, through two apertures placed near the extremity of the drill. The double faires of M. Civiale, which are parted by a transverse bar, or simple head, as they retract upon themselves under the influence of a quick screw acting upon a central stem, do not appear to me to be calculated to remain in practice. M. Heurteloup, in order to obtain an excavation of from 8 to 12 lines in diameter, made use of a drill with a cylindrical head, and pierced on one side, and which at first served him as a *stone perforator*, (*perce-pierre*.) When he afterwards wishes to hollow out, (*évider*), excavate, and reduce the calculus into a shell, he pushes by means of a central stem, the base of a toothed *virgule*, contained in the head of his drill, and which immediately goes beyond its circumference to the extent of one, two or three lines, while making its escape through the lateral aperture.

II. *Evidement*.—For calculi that are still larger, M. Heurteloup has invented what he calls his *forceps-évideur*, that is to say, a cylindrical drill with a jointed fraise, and which may be parted laterally in such manner as to make an excavation of more than an inch in diameter; but a slight inspection of this instrument will show that we cannot place any great confidence in it and that it cannot have any great degree of power. M. Amussat has also occupied himself with the subject of evidement. His drill, which is based on the principle of one of those of M. Leroy, is composed of a central head and two lateral portions. When we have perforated the calculus with the instrument closed, its stem is withdrawn by means of a screw which is between the two faires, and which separates them so as to allow of our making a considerable enlargement to the excavation. This is the drill which two cutlers, MM. Greling and Charrière, have successively modified. The cylindrical drills, having a virgule which is separated at the distance of three to four lines from the axis of the principal stem, like those which have been proposed by MM. Tanchou and Pecchioli, appear in my judgment to be less commodious. I would say the same of the faires with triangular points and with wings like a windmill, like those of M. Pravaz, and also of that which M. Rigal recommends with a sheathed drill. This last mentioned surgeon also proposes to obtain another result, different from any proposed by those who have preceded him. When the perforation is effected, a quick screw withdraws the fraise between the two blades which constitute its sheath, separates them and fixes them firmly in the centre of the calculus, which is thus found as it were impaled upon the drill in such manner as to be susceptible of being broken up against the inner side of the branches of the litholabe. M. Rigal considers, on the other hand, that in separating the forceps from its instrument, we would be enabled to break up the stone into splinters by an excentric effort. In this respect he follows out the views of M. Civiale, who proposes a similar means after lithotomy, when the stone is too large to be extracted without danger; or those of M. Leroy, who says the same of calculi of the urethra; an idea which Fischer (*Thèses de Haller*, t. II., Fr. transl.) and some authors of the seventeenth century had also entertained. It is doubt-

ful if lithotripsy by excentric rupture will ever become a general method, whether we effect it by the action of sheathed drills, or divergent blades, or by means of percussion upon the free extremity of the lithotritic instrument. As to evidement in itself, the fraise with a double elastic branch, as proposed by M. Leroy, and as it has been improved by MM. Amussat and Charrière, is the one which has most solidity and is most certain of effecting this object, though the mandrin with a virgule, as contrived by M. Heurteloup, and the developing drill of M. Pecchioli, might replace them in certain cases.

III. *Concentric Crushing, (Broiement.)*—In place of opening the stone at its centre, and of hollowing it out from the interior to the exterior, Meirieu conceived the idea of reducing it into powder, by acting from its surface to its central portion, by means of a cylindrical drill provided with two virgules with a lateral development, and which could be separated at pleasure so as to form with the stem a sort of clover leaf. MM. Récamier and Tanchou have followed out the same principle, and all the efforts that have been made have had no other object than that of rendering its application more easy by improving either the litholabe or the lithotritor. It cannot be denied that this way of breaking up the stone is more rapid than the preceding; that we may by this means possibly pulverize a large sized calculus at a single sitting; that it protects us from the inconveniences of breaking the stone into fragments, and enables us to hold it grasped to the end of the operation, without being under the necessity of letting go our hold to resume it at another time. But the drills and the fraises which we are obliged to make use of are necessarily weak, and may bend or break. The separation of the virgules may lead us to apprehend that they may become entangled between the branches of the forceps, if we are compelled to approximate them a little too near the sheath. We have, moreover, all the inconveniences which I have pointed out in speaking of the litholabe with multiplied branches supported by a silk cord. The essays of Meirieu and those of M. Récamier, were only made upon the dead body. M. Tanchou, (*Lancette Franç.*, t. V., p. 232,) like M. Pamard, (*Transact. Méd.*, t. VII., p. 306,) went farther. His apparatus enabled him in a patient to break up at a single sitting, a calculus of a certain size. On the other hand he permitted me to witness essays which he had the goodness to make in an adult man whom I had sent to him for this purpose. The stone could not be grasped, and I supposed that lithotomy would be necessary. We then ascertained that the foreign body was of too large a size to allow of any method of breaking it up to succeed. It would not, therefore, be just to deny to the apparatus of M. Tanchou the capability of being applied with advantage. The breaking down the stone from the circumference to the centre by means of the inner surface of the branches of the litholabe, against which the calculus which is impaled by the sheathed drill is made to turn, as had been proposed by M. Rigal, (*Bull de Fér.*, t. IX., p. 67—t. XXI., p. 104,) has something very ingenious in it, and at first sight even specious, but the slightest reflection also shows immediately that such a suggestion must be inapplicable.

IV. *Crushing the stone, (Ecrasement,) is one of the means which the ancients especially directed their attention to. Thus it was the écrasement, and not the breaking up (broiement) of the stone which was recommended by Acaravius, and which F. de Hilden and many others made use of. Ecrasement was also the method which Amussat used in 1822. This mode of breaking up calculi, for a time forgotten, appears to be upon the point of contesting the palm with broiement, properly so called. Among those who propose this mode, there are some who adopt it only as an accessory method, for the small calculi, or for the fragments which result from perforation and evidement; while others endeavor to bring it into repute as a general method. In the first case it has almost always been combined with the other processes. When M. Civaile, for example, finds that he has seized a calculus of only 3 or 4 lines dimensions, he compresses it forcibly between the branches of his litholabe, and afterwards crushes it by pushing the head of the lithotritor by means of the palm of his right hand. He proceeds in the same manner with fragments that are somewhat large, and with all those particles which are of too considerable size to be extracted entire through the urethra. M. Civiale had also contrived a forceps with two branches, which could glide upon each other, and crush the small stones by a movement backwards and forwards, nearly in the same way as with the instrument of M. Amussat. M. Rigal has modified this instrument in making it act by means of a quick screw, while dispensing with the movement backwards and forwards. M. Colombat endeavored to make it more easy to manage by adding volants to it, to give it motion, and by fixing a small chain to the extremity of its branches, in order that these, should they be broken, might be brought out without danger. The forceps, which in this respect has attracted most attention, is the one that M. Heurteloup has delineated under the title of *brisecoque*. Its branches rub against each other, and by means of an encliquetage we are enabled to make these branches re-enter into the external canula, with such degree of force, that they scatter into splinters the hardest and most unyielding calculi. A forceps constructed upon nearly the same principles, and which has three instead of two branches, was contrived in 1829 by M. Rigaud, (*Thèse*, No. 276, Paris, 1831.) This species of *grugeoire* can seize calculi of an inch in diameter in the same manner as the ordinary litholabe. The addition of an encliquetage, enables us also to give motion to its three branches, and to execute on the three corresponding points of the stone such frictions as will reduce it into a fine powder, and allow us to *grind it up* and destroy it completely before letting go our hold of it. It is a species of *brisecoque* or stone-breaker, which does not possess as much force as that of M. Heurteloup, but which has the advantage of breaking down the calculus by friction instead of splitting it into fragments. A skilful cutler, M. Sirhenry, has constructed another forceps, which is equally well calculated for the écrasement of calculi. Its three branches, which are destitute of hooks, present on their inner side a dentated crest, which is to be applied upon the foreign body. It is to be introduced into the bladder in the same way as an ordinary litholabe. After the calculus is*

once seized, we make the branches re-enter into the external canula by means of a quick screw, and this screw acts with so great a degree of power, that even siliceous and flinty stones are incapable of making resistance to it. An essay which was made with it at the Hotel Dieu, was followed by the breaking of one of its branches, and this, in fact, is the danger that we would appear to have to apprehend from it at first view; but M. Sirhenry replies to this, that the instrument which was made use of, was not designed for such large calculi, and that he had foreseen the accident in question. It is at least true that the instrument which he has shown to me, and which the hardest calculi are incapable of resisting, possesses so great a degree of strength, that it would seem absolutely impossible to break it. An objection which some persons have also made against it, is that of exposing to the risk of wounding the bladder by means of the splinters of stone which the instrument has a tendency to throw off to a considerable distance. This danger is evidently imaginary. A stone which was thus broken up between my two hands did not occasion me any sensation of pain, and inasmuch as we act in the bladder full of fluid, there can in this respect be nothing in reality to apprehend.

V. *Of these four modes of breaking up calculi*, there is no one of them which deserves to be adopted to the exclusion of the others, or which should be absolutely proscribed. The perforation of a stone of from 5 to 6 lines in diameter, may be advantageously combined with écrasement. If the fraise has made an opening of four lines, for example, we may, after having drawn it back to near its sheath, bring the litholabe forcibly backwards, and make use of it then as a brisecoupe. Instead of this process we may, if the exploring means we have made use of have enabled us to ascertain with certainty that the calculus is of but little size, employ the grugeoire of M. Heurteloup, or one of the forceps, either that with the encliquetage or with the volant, or the quick screw, which have been described above. When the stone exceeds ten lines or an inch, the most suitable process will then be successively, perforation, then evidement, and finally écrasement. By means of the forceps of M. Rigaud, we might succeed without any very great degree of difficulty, in breaking up calculi of from 8 to 12 lines in diameter; which could be effected, as I conceive, with still greater facility, by means of M. Sirhenry's instrument. A remark which should not escape the attention of the practitioner is this, that by means of the new écrasement forceps, which will be mentioned farther on, the operation is found at the present day to be surprisingly simplified, since it is no longer necessary, with these, to have recourse to drills, faires, supporting apparatus, &c.; so much so that they have succeeded in giving general reputation to lithotripsy.

VI. *Accessory apparatus*.—Whatever may be the lithotritic apparatus selected, the means by which it is put in operation deserves also the attention of the surgeon. The mechanism of stone-breakers, brisecoupes, saxifrages and grugeoires having been everywhere based upon the system of quick screws, double levers, encliquetages, or engrangements, constitutes a part of the principal instrument, and does not require to be separately described. This remark does not apply

to broiement, properly so called, whether by perforation, evidement or concentric pulverization. Two kinds of springs, then, become indispensable : 1st, to steady the litholabe firmly ; 2d, to give action to the lithotritor.

a. In regard to the first, the chevalet, which is a sort of mandril lathe, as proposed by M. Leroy, after Ducamp, and as modified by MM. Civiale, Rigal, &c., has been generally adopted. Some persons, however, have proposed to substitute for it an *ebony vice* (*étau en ébène*) with one or two grips; others have directed much attention to the manner of steadyng at the same time both the instruments and the patient. From hence comes those beds, which are or are not furnished with supports, as proposed by MM. Leroy, Heurteloup, Tanchou and Rigal, and which are evidently useless. The bare idea of metallic supports intended to be kept immovable on the foot of the operating table, like the one proposed by M. Charrière, or the suggestion of *mechanical beds* (*lits mécaniques*), like that of M. Heurteloup, is in itself revolting. Let us imagine, for example, a forceps, or any kind of lithotritor manceuvering in the bladder of a living man, while a solid bar of iron implanted in the table fixes them securely outside, and we shall see whether the slightest irregular or unexpected movement on the part of the patient, is not calculated to make us tremble for the consequences. However ingeniously constructed these dead forces may be, they should be rejected, and we must depend for accessory means upon the hands of intelligent assistants, or upon the surgeon himself. M. Amussat, by pressing with his chest against the lithotritor, by means of a point d'appui interposed, in such manner as to be enabled to hold the litholabe with the left hand at the same time, that with the right hand he is enabled to turn the drill with a wooden handle, in the manner of a centre-bit wimble (*vilebrequin*), has none of these dangers to dread; but it acts with less force than when we make use of the mandril lathe, and fatigues much more, so that all things being properly considered, the chevalet is still the instrument which is best adapted to the object in view.

b. In the *action of the drill* there are two forces to be directed, that which presses upon its outer extremity to keep it applied against the stone, and that which compels it to turn upon its axis. Those who have supposed that they could substitute for the first, either the thumb, forepart of the chest or the knee, are evidently under an error, unless, in fact, they can discover a better arranged system of mechanism than that of the wheels, villebrequins and manivelles hitherto employed. The cork-screw spring, enclosed in the movable poupee of the mandril, certainly leaves much room for improvement. Nevertheless, I see nothing which can be advantageously substituted for it, so long as the bow (archet) shall continue to be preferred as the rotating power. The rings, volants and manivelles, which at first view would appear to be sufficient to supply the rotating power, are not sufficiently extended in their action, nor do not sufficiently favor the forces put into play, nor the movements made use of, to enable us to derive any great advantage from them. The engrenage wheels placed underneath, as was proposed by M. Leroy, or upon the side, as in the apparatus of M.

Pravaz, whether they act upon a pignon, parallel to the axis of the litholabe, or catch into a dentated conical and circular pignon, impart to the drill as rapid a movement as can be desired ; but there still remains to be discovered a means of making pressure upon its extremity at the same time with a sufficient degree of force. As to the mechanism of the bow, it is the same in lithotritry as in the mechanic arts from which it has been thought proper to borrow it. Until the wheels can be substituted for it, prudence requires that we should continue to make use of it, and the useful results which it has already procured, enable us after all to employ it with more confidence than any other means designed for the same object. All these contrivances, however, become unnecessary in the apparatus of new forceps and nooses.

VII. *The general operative manual.*—Before proceeding to lithotritry, there are some special precautions to be observed. Upon the supposition that the urethra has been diseased, we should in the first place restore it to its natural dimensions, and impart to it its original dilatability. Even though this canal should be sufficiently large to give free passage to the instruments, it may be advantageously habituate it during several days to the action of flexible bougies, or sounds, in order to blunt its sensibility, and to accustom it to the presence of foreign bodies. It is advisable also for the same reason, to throw up some injections into the bladder, in order to diminish its irritability, and that it may be distended with more facility at the time of the operation. Although these preparatives are not indispensable, they cannot however be absolutely omitted, but in a very small number of cases.

a. *Position of the patient.*—In private practice we may lay the patient on his back on the edge of the bed, with the pelvis supported upon a cushion which is somewhat hard, the feet resting upon stools, and the head moderately flexed upon the chest. At one's own office, or in a public establishment, we may place him upon a narrow bed, of convenient height, in such manner that his legs may go beyond the foot of the bed, and be supported in the manner just described. In this position there is no need of his being tied or bound down ; the posterior wall of the bladder having become its lower wall, enables the calculus to become removed to a greater distance from the urethra, and to present itself, so to speak, of its own accord, to the litholabe. It is moreover easy to modify this according to necessity, either by a greater elevation of the pelvis, if the stone has a tendency to remain in the bas fond, or by diminishing the thickness of the cushion, when we apprehend the contrary ; which resource is not afforded us to the same extent by the employment of lithotritic beds or tables.

b. *Injections.*—A first stage of the operation consists in filling the bladder with tepid water, or some emollient decoction. Unless this injection were made, we could not give free play to the litholabe or lithotritor. The stone could not always be seized, and the bladder might be frequently pinched up by the instrument. This injection is effected by means of an ordinary catheter and hydrocele syringe, with more certainty and with less embarrassment than with bladders, or bottles of caoutchouc, or by the canula or sheath of the litho-

labe. After the silver catheter is once introduced, it serves at the same time to ascertain again the presence of the calculus. An assistant then immediately takes charge of it in order that the surgeon may adapt the syringe of the syphon to it, and throw up the liquid. When from 8 to 12 ounces of the injection have been thrown up, or what is better still, as soon as the patient has a somewhat urgent desire to urinate, the catheter is to be withdrawn in order that the lithotritic apparatus may immediately be substituted in its place, and before the injection has time to be discharged.

c. *Introduction of the forceps.*—The drill, provided with its drill box to receive the bow, being glided into the canula of the forceps, and the litholabe, furnished with a box at its outer extremity, being introduced in its turn into the common sheath in such manner that its branches accurately closed upon the grooves of the head of the lithotritor, represent an olive head which is to be lubricated with ointment, are then introduced united together into a single piece, in the same manner as a sound into the urethra. For this purpose, the operator placed on the right of the patient, grasps the penis with his left hand, in the same manner as in ordinary catheterism, and raises it slightly upwards; presents to it perpendicularly with his right hand, the instrument well oiled or greased; gently inserts it by slight movements of rotation into the meatus urinarius; soon arrives at the bulb; stops for a moment; gently but firmly depresses his hand in order to pass under the symphysis and through the membranous and prostatic portions of the urethra, and in this manner arrives beyond the neck of the bladder.

d. *To find the stone.*—Before opening the litholabe, we look for the calculus by passing around, by means of gentle vibratory movements, the olive of the metallic tube, which is still shut up: 1st, from before backwards, upon the middle portion of the bas fond and posterior wall of the bladder; 2nd, from behind forwards, in order in returning to complete the circle, either on the right or the left side; 3d, from before backwards a second time, returning by the opposite side in order to come back on the middle portion, where the stone may have again fallen, and then transversely in such manner as to leave no point on the vesical wall, which has not in reality been touched. If, notwithstanding this minute research, we encounter nothing, it would be better to defer the operation than to persist in continuing the exploration. We ought not, however, to give up until after having sufficiently varied the posture of the patient, and after having thoroughly satisfied ourselves that no cavity or natural depression has been overlooked.

e. *To open the forceps.*—When the seat of the stone has been proximately determined, the operator takes in his right hand the extremity of the litholabe, which he holds immovable, and with his left hand draws towards him the external canula, as if with the intention of extracting it from the urethra, and in this manner enables the forceps to open itself by leaving it to the natural elasticity of its branches. In this manner the bladder incurs much less risk, than if he made the litholabe glide forwards without deranging its sheath for the purpose of protecting the urethra, the entrance into which latter, moreover,

remains perfectly filled up by the gorge of the *triploide* which opens itself in the bladder.

f. The finding of the *calculus* and the grasping of it is frequently a more difficult matter than is supposed, so much the more so as it is not sufficient alone that we should feel it in order to know exactly where it is. To discover it, therefore, exacts the greatest degree of attention. The difficulty is to know whether we touch it: 1st. by the convexity of one or both the lower hooks of the instrument; 2nd, by the middle portion of one of its branches, either on their inside or outside, and in this case whether it is to the right or the left; and 3d, by the lower surface of these same branches near the prostate, &c. In this respect the following rules should not be neglected. If by making the forceps vibrate, we perceive that it strikes upon a foreign body and gives the sensation of a double shock, the calculus is below its two branches and behind the prostate. If one of the branches descends lower than the other while turning on its axis, and a simple shock only is produced, the calculus will then be found on the most elevated part. If it is in front, and the two hooks pushed in succession, and not simultaneously, alike feel it, we may consider that the calculus lies in the interval between them. If one of them only recognizes it, it should be on one side. We ascertain whether it is on the right or left by keeping one hook immovable, while we make the other gently advance. Admitting in place of this, that it may be outside of the left branch itself; if, in taking the other for a point d'appui, we raise up and depress it by movements of rotation describing the arc of a circle, it will not fail to be soon recognized, while the same movements repeated on the opposite side will discover nothing. A transverse movement of slight extent to the right and then to the left, will in the same manner inform us if the stone is in the interior of the litholabe, or nearer to one of its branches than the other, or in the centre. Finally, these various movements combined with some degree of skill, will not permit us to hesitate for any length of time upon its actual situation, provided the surgeon has taken the precaution to place two of its hooks below and upon the same line. Having arrived to this point there can be no longer any great difficulty in embracing the calculus in the open space of the instrument, and consequently none in grasping it. In order not to derange the relations of the objects, we again take the free extremity of the forceps and raise it slightly upwards with the right hand, in order that its branches may continue to rest against the bas fond of the bladder, after which we push over it again the sheath or external canula by seizing the leather box of this last with the left hand. It is advisable, moreover, before doing this, to impart to the drill certain movements backwards and forwards in the tube, and between the divisions of the litholabe, until the fraise has actually touched the stone. By an effort made in the contrary direction upon the sheath and upon the stone, we finally secure this last, after which we have nothing more to do than to attack it with the lithotritor.

g. To apply the mandril lathe and the bow.—This is the moment for placing the supports and the moving powers. A pressure screw, in the first place, prevents the two instruments when closed from re-opening. A mortice on the head of the mandril then embraces in

seizing it below, the quadrilateral extremity, having lateral arrests, of the sheath in front of its box, while a pressure screw immediately secures them in this position. The small cap (cuvette) of the spiral spring, supported by the poupee of the mandril, is then applied upon the queue of the drill. We push forward this poupee with a force proportionate to the action which we intend to exercise upon the stone and drill. This in its turn is to be arrested by a turn of the screw. If the pressure of the spring appears to be too strong, a fourth screw enables us to suspend it or to resume it at pleasure. The apparatus is then prepared. An assistant with his face turned towards the pelvis, and placed between the legs or on the right of the patient, takes charge of it and seizes its handle with his right hand and its angular part with his left hand. The operator takes the cord detached from the hook of the bow, passes it around the drill box, which has previously been adjusted upon the drill, and reapplies its buckle upon the extremity of the elastic bow, from which he had momentarily separated it; it being well understood that this cord, while it should be sufficiently slender, should possess a great degree of force, and work with the least degree of friction possible.

b. *Broiement*.—This being arranged, the surgeon, who is to be always placed on the right, holds the instrument firmly in his left hand between the penis and the head of the chevalet, while with his right hand he puts the bow into action, taking care to incline its motion forward, and to unite pressure against the stone with rotation, should the spring not appear to be sufficient. The drill box moreover has been fixed in such manner as to strike against the drawing box of the litholabe, before the head of the drill can reach the vesical extremity of the litholabe, and go beyond the circle of the forceps. This first perforation having been terminated, we withdraw the poupee of the mandril backwards, in order to bring the drill towards us. If the stone is small and friable, we endeavor to crush it by acting forcibly in an opposite direction on the two cork boxes, before loosing our hold upon it. In the contrary case we open the forceps gently, and then by small taps on its free extremity, endeavor to move the calculus and change its position; a change which we may assure ourselves of, and may favor or even accomplish, by means of the drill directed with the right hand. If we cannot in any way effect this, we let go the stone altogether, in order to regrasp it in the same manner as if it had escaped in spite of the intention of the operator. Under the apprehension that it may present itself exactly at the same diameters, which rarely happens, we push the head of the drill against it, and displace this drill again, should it again fall into the same hole, nor set it in movement a second time by means of the bow, except it shall meet a solid portion of the body which is to be destroyed. The employment of *developing drills*, and fraises with a virgule or with files, or with simple or double wings, is subjected to the same rules, whether we have recourse to them at first, or only after the first perforation. In the first case they are to be separated apart in such manner that they may turn freely behind the calculus, without touching the inner surface of the branches of the litholabe, and that the central head may serve as an axis to the lateral wings while they are acting on the

stone. In the second case, they are to be opened only by degrees and in the interior itself of the first perforation. It is under such circumstances that the name of *échoppeur* and *évideur* may be literally applied to them, inasmuch as their effect is to transform the stone into a shell, and to dig out a conical cavity in it, the apex of which is placed posteriorly. The spherical stones, which are somewhat large, and which are [accurately] grasped centre to centre, are the best adapted to these drills ; those stones which are elongated, and which are seized only by one of their projections or at their side, and which leave a void on one side between the branches of the forceps, render the action of the drills difficult and sometimes dangerous, in consequence of the unequal resistance which they encounter while turning. The apparatus of M. Tanchou, though more ingenious, is not altogether exempt from this inconvenience, and in my opinion it would be advisable in such cases to confine ourselves to the simple percussion (*taraudage,*) combined with the *écrasement*. When the stone is actually broken up, or the patient too much fatigued, that is to say, after the expiration of 5, 8, 10, or at most 12 minutes, it is advisable to terminate the sitting. The bow is to be then removed. We loosen all the pressure screws in order to remove the chevalet and to withdraw the drill in proportion as we shut up the forceps. When a fragment has become arrested between its branches, we should, if it is not too large, withdraw it with the rest of the instrument ; but should there be ever so little reason to apprehend that it may injure the urethra, it is better to let go our hold upon it or make it fall again into the bladder by pushing it back by means of the lithotritor. The remains of the injection and urine which the patient generally feels a desire to discharge immediately after, almost always bring away portions of the calculi, and a greater or less quantity of powder resulting from the broiment, and which are a proof in regard to the patient, that the operation has been attended with as much success as it was possible. A bath is to be prescribed immediately, or during the course of the evening. In ordinary cases, the attentions required, consist of nothing more than those which are demanded during any state of convalescence, or for valetudinarians in general. We recommence at the expiration of 2, 3, 4, or 5 days, according as the system has been more or less disturbed by the first essay, and always with the same precautions, and so on consecutively until there is no longer any vestige of calculus in the bladder. One or two explorations by means of a simple sound at intervals of a few days, are also requisite in order that we may obtain satisfactory evidence on this point, and should not on any account be neglected.

B. *Curvilinear method.*—It is a remarkable circumstance, that the breaking up of a stone could not be accomplished until at the epoch when it was demonstrated that it was practicable to introduce straight instruments into the bladder. To place the practicability of this process beyond dispute, even grave anatomical errors were adduced in support of it ; and now, when there is no longer any doubt with any body in respect to both these circumstances, it is found that curved instruments enable us full as well as those that

are straight, to attain the object which had been so long desired!

I. The *mandrin file*, employed by Major Martin, was introduced through a curved catheter. The instrument of M. Eldgerton also had the usual curvature of sounds, as likewise had the first *lithoprienne* forceps of M. Leroy. The most difficult point in the ancient system was to make the lithotritic instrument turn on its axis. Now M. Pravaz, in 1828, succeeded in giving the same facility to the movements of the drill or fraise, in a curved as in a straight catheter; for that purpose he transformed the inner fourth of his perforator into an articulated stem or small chain, which was full as strong, however, as the stems which were of a purely cylindrical form and of one single piece. Nevertheless, his instrument, which was curved into a very elongated arc, did not yet possess all the advantages which it was desirable to obtain from it, and the author ultimately gave to it a curvature similar to that of ordinary sounds, that is to say, a curvature which comprised only the vesical fourth. M. Pravaz did not succeed with this instrument, though he applied it once on the living subject in one of the hospitals of Paris. But the failure in this case may be attributed to the want of practice, to the indocility of the patient, who was a child, and especially to the peculiar character of the calculus. It is difficult in fact to conceive why his apparatus, which differs from the others only in the direction of its principal portions, should not be capable of effecting the same results. I would even remark that it ought to be introduced with greater facility and should produce less annoyance upon the urethra. M. Leroy has shown me one in every respect similar in regard to the arrangement of the chain and drill, and the curvature of which is analogous to that of ordinary sounds, but which he intended to modify still farther; this instrument however has this remarkable feature in it, that the third branch of the litholabe is fixed and constitutes a part of the conducting canula. The instrument of M. Pravaz, as well as that of M. Leroy, enables us to make use of perforation, evidement and concentric broiement, in the same way as the straight instruments, but their form is much more applicable still to écrasement.

II. MM. Weiss and Rigal have also given a slight curvature to their encliquetage or friction forceps, and the species of *noose* used by M. Jacobson is also curved. This last instrument is composed of an external canula like the others, then of a steel cylindrical stem which perfectly fills it up, and prolongs it to the distance of three inches in the direction of the bladder, which stem is formed of two halves jointed at their extremity, one placed above and the other below, in such manner that the lower one being pushed forwards, separates itself from the upper one which is fixed, and forms, by means of two or three hinge-joints, a noose which is capable of embracing a calculus of from 12 to 15 or 18 lines in diameter. A quick screw is placed on its free extremity and enables us to replace it in its original position. The one which was proposed by the Danish surgeon had only two joints in its lower branch. Dupuytren considered that it would be better to give it three, in order that the noose might be more uniform and more rounded. It is to be introduced shut up, into the bladder. In pushing it afterwards upon its

outer extremity, its lower half separates itself little by little. A void is made between it and the other half, which void is increased at pleasure, and the extent of which is ascertained by figures placed outside of the nut. The calculus becomes lodged in this void or noose. When it is accurately embraced, we act on the quick screw, as if for the purpose of isolating it and shutting up the instrument by the approximation of its two branches. Nothing is more simple than an apparatus of this kind, nor should anything be more easy than the operation itself, which in this manner is relieved of the necessity of supports, containing means, &c. Nor have we even to fear here the breaking of the instrument, for its joints would enable us to extract its broken portions without any danger. All that may be said is that from having only two branches, it may not be enabled to seize the calculi with as much facility as the others do, and that from being confined to the crushing merely of the stone, we are obliged to seize hold of all its fragments separately. I will add that the detritus of the stone, which sometimes remains attached to the inner surface of its branches, is also calculated to render their approximation difficult. Dupuytren, who put it to the test on living man, was very well satisfied with it, and was enabled in four or five sittings to destroy completely a calculus of very large size; I have also made use of it with the same advantage in many patients; so that whether it be considered in the condition in which it now is, after the improvements made upon it by MM. Leroy, Ségalas, Thomas, Pasquier and Charrière, or after it shall have undergone certain modifications of which it appears to me to be still susceptible, this instrument will make excentric broiement by perforation or evidemment a matter hereafter of much less importance, in addition to the fact that it has already disproved the necessity of straight instruments.

III. *M. Ségalas*, in adopting the curved lithotritor, also deemed it advisable to modify it, in using it upon a patient who could not support the straight sounds. The improvements of this surgeon relate chiefly to the stem of the perforator, which in his apparatus, instead of having an articulated chain, is formed of metallic wires united in a bundle; and also have reference to the means of bringing to the outside and without danger, the fragments of the litholabe, should it be broken in the bladder; but I cannot see in these improvements any other than a very slight alteration, together with unnecessary complications.

IV. *New processes.—M. Heurteloup*, going back to the ideas of the monk of Cîteaux, has proposed a curved instrument which opens in the manner of a shoemaker's *podometer*, and which, after having firmly embraced or secured the stone between its two branches, enables us to break it and to reduce it into fragments, by means of strokes with a hammer made upon the extremity of its movable or upper branch. This apparatus has effected an absolute revolution in lithotomy, and to such extent, that at the present time no other instrument scarcely is any longer recommended. In place of the original *percussor* of M. Heurteloup, surgical practice at the present day has at its disposition the percussion and compression forceps of M. Touzet, the same instrument modified by MM. Leroy and Charrière, the dynamometric percussor of M. Beniqué, the screw stone-breaker of M.

Sirhenry, the pressure and percussion stone-breaker of M. Amussat, a similar instrument of M. Clot-Bey, the percussion stone-breaker of M. Costello, that of M. Lestrâne, the excentric screw stone-breaker of M. Charrière, the stone-breaker with a central screw or volant of M. Ségalas, that of M. Civiale with rings, that of M. Leroy of funnel shape, the transverse stone-breakers of M. Amussat, those of M. Ban-cal and M. Bevenuti with handles, and better than all these the pignon stone-breaker, such as it has been improved by M. Charrière. These instruments, which may be manipulated with as much facility as a shoemaker's podometer, and which appear to have all derived their origin from that of Stodard, that of M. Hodgson, or that of M. Retoré, (*Leroy, Journ. Esculap.*, t. I., p. 3; *Hist. de la Lithot.*, Paris, 1839, in 8vo. fig.) or the forceps of Weiss, or the catheter proposed by me in 1827, or the double catheter of Cléland, (*Bibl. de Planque*, t. X., p. 398, in 4to,) render the broiement much more secure, simple, and prompt, than by the ancient method. Their free extremity being armed with transverse pieces, handles, (poignées,) plates, buttons, screws, volants, nuts, heads, or pignons, enable us to act upon the calculus either by percussion or by pressure, with as little or as much force as we may desire. Moreover, as they possess a large opening at the other extremity upon the inferior or fixed branch, an opening which in the forceps of M. Saas the upper or movable branch may go beyond posteriorly, they cannot become choked up with fragments or gravel. Constituting in their ensemble instruments that are sufficiently slender, though very solid, they give much less annoyance to the organs than the other litholabes.

a. *Operative process.*—The patient should be placed and arranged in the same way as has been described above. The forceps is to be introduced, shut up, and according to the usual rules of catheterism. The surgeon having introduced it to the bottom of the bladder, and made use of it to ascertain again the presence of the stone, opens it by drawing upon its movable branch with his right hand, while with his left hand near the penis he holds the other branch fixed. He then makes it describe the movement of the quarter of a circle, which quickly brings its convexity upon the middle portion or side of the bas fond of the bladder. By pushing the branches of the forceps towards each other, it is soon ascertained if the stone is grasped. In the contrary case, the same movement is to be repeated, or we incline the branches or point of the instrument to the right or left, or downwards or backwards, in such manner as to seize the calculus firmly. As soon as it is well embraced, we commence with breaking it up. The remainder of the manipulation then varies according as we adopt percussion, ecrasement, or simple pressure.

b. *Percussion.*—If we propose to break up the calculus by percussion, we fix the instrument by means of one of the supports mentioned, or with the left hand; with a small hammer made *expressly for this purpose, and held* in the other hand, we make rapid strokes upon the button, head, or plate of the litholabe, with a force proportioned to the resistance of the calculus, without however being ever increased to such degree as to break the forceps. Under this point of view the dynamometric apparatus contrived by M. Beniqué, as well as all the other means hitherto proposed, in order to proportion the de-

gree of percussion to the force of the instrument, appear in my judgment to be still less convenient and less secure than the hand hammer.

c. If pressure with the hand should appear to be sufficient, the surgeon, who is always to be placed on the right, and with his back turned towards the head of the patient, or to the outside, holding the litholabe in the same way as in the preceding case, glides his right hand under the instrument, in order to embrace its root from below upwards and from behind forwards between the middle and ring finger, while the palm of this hand makes full pressure upon its button or plate, by the action of the wrist.

d. On the supposition that the instrument was provided with handles or traverses, as in that of M. Bancal, for example, it would be necessary that an assistant should fix its root firmly in the direction towards the urethra; the operator being situated in front or upon the side, then embraces the double traverses of the fixed branch, and of the movable branch on each side, in order to press upon them with all the force of his two hands, and to make them glide on each other while crushing the calculus.

e. To effect écrasement by means of the screw, the right hand causes the nut or the head-volant, or the virole-volant to turn, by a mechanism which is too simple to make it necessary to describe it. The instrument, moreover, is fixed and secured as in the preceding case.

f. The employment of the pignon is attended with no less facility. The stone being grasped, the surgeon holding the litholabe with his left hand in front of the urethra, adjusts and makes its key, which is applied on the left side if he is on the right, and on the right side if he is in front, act in the pignon of the instrument until its two branches are approximated and closed.

g. As the same instrument, among those which are constructed by M. Charrière, enables us at pleasure to make use of the percussion hammer, the dynamometric lever, pressure with the hand, and the nut or volant, or pignon, the surgeon may substitute one of these manipulations for the other, and employ them in succession or alternatively, without changing anything in the rest of the operation, and without being obliged to let go his grasp upon the stone, or to withdraw the forceps.

h. Should the calculus have once become broken, or escaped from the forceps, its fragments are to be taken up and crushed in the same manner; we may in this manner crush up 4, 6, 10 and 12, or even 15 fragments at a single sitting, if everything goes on well, and the patient suffers but little, and should the whole sitting not extend beyond ten to fifteen minutes. Should the calculus appear to be very hard, or make resistance, it would be imprudent to persist in crushing it. We let go our hold upon it in order to grasp it in a different manner; we strike upon it again with direct and sudden strokes. It is in these cases that percussion possesses a positive advantage over pressure. In cases however, where the hardness of the calculus would seem to make too great a degree of resistance, as I saw it do in the case of M. Desaugiers, and on which occasion nearly two thousand strokes with the hammer did not enable M. Leroy to make any ap-

preciable impression, lithotomy could still be substituted for lithotritry.

i. Before withdrawing the instrument, we shut it up completely, while cautiously avoiding to pinch up the bladder or inner extremity of the urethra between its branches. Should portions of gravel, or fragments continue to remain attached between the branches of the litholabe, they are to be separated from it, not by means of M. Leroy's rake, (*râteau*), nor the blade grater (*lame-râpe*) of M. Charrière, which can scarcely be combined with any other instrument than the stone-breaker of M. Jacobson, but by repeated drawer-like movements, and slight movements of percussion, or by friction with the movable extremity, which is to be pushed one or more times through the aperture of the fixed branch, in such manner as to pass a line or two beyond its posterior plane. It is so much the more important not to omit these precautions, inasmuch as the forceps, when angular bodies have become entangled in it, may, as it comes out, irritate or lacerate the urethra; and because when the instrument is thus rendered too large, it may moreover become wholly arrested, either at the membranous portion, or in the fossa navicularis of the passage.

j. All the other attentions moreover, required by the operation, are in these processes, both in respect to their manual and subsequent treatment, the same as in the processes with straight instruments.

### § II.—*Difficulties of Lithotritry.*

Notwithstanding the leather boxes, and the accuracy with which the three principal pieces of the apparatus set into each other, it sometimes happens that the injection escapes between them, or between the external canula and the walls of the urethra. A small gutter which is made upon the dorsum of the sheath, and which communicates with the bladder by means of a groove which runs along the outer surface of the litholabe, is added to some of the new apparatus, with the view of remedying this inconvenience. We might in fact apply to this the syphon of the syringe, and make use of it as a catheter to renew the injection; but the irritability of the bladder soon places things in the same condition; fortunately the organ rarely empties itself completely.

A. *Before puberty* lithotritry is attended with less facility than in the adult, because of the slight degree of development of the sexual organs, the small calibre of the urethra, the indocility of such patients and the exquisite sensibility of the parts. The instruments cannot have more than two to two lines and a half in diameter, which sensibly diminishes their power, while at a more advanced age we may give them as much as four lines, although those of three to three and a half lines generally suffice. It is still less adapted to the first years of infancy, for the reasons just given, and moreover because the bladder, which is raised up too much in the pelvis, increases to the same extent the curvature of the posterior third of the urethra, and also because at this period of life lithotomy presents numerous chances of success. It does not however follow from this that the broiement of the stone is an impossible operation in infants. MM.

Leroy, Ségalas and others have demonstrated the advantages that may be obtained from it at that period of life. I have said only, and I still maintain, after having frequently verified the fact, that in general it then involves more inconveniences than lithotomy.

B. *The prostate*, in certain patients, renders the application of lithotrity a matter of considerable difficulty, in consequence of the urethra being pushed back behind the symphysis. It is under such circumstances that curved instruments would, to some extent, become a matter of necessity. M. Leroy, struck with this circumstance and with the view of lessening its gravity, and from having frequently witnessed the danger or the impossibility of using straight instruments, proposes a means which is very simple in appearance, which he calls the adjuster (*redresseur*) of the urethra, and which consists of a gum-elastic catheter which is introduced curved, and is afterwards to be straightened when in its place by means of a straight stilette, which a screw pushes gently into its interior from before backwards. This instrument, analogous to that proposed by M. Rigal for the same purpose, and which, as has been remarked by M. Pravaz, the lithotritor cylinder conducted by means of spiral movements of the hand through a large flexible catheter opened at its two extremities, might if necessary replace, exposes to the risk of serious inconveniences, and to the contusion of the verumontanum and laceration of the urethra, in consequence of the screw or nut, the force of which cannot be calculated, and because the head of its stilette cannot progress except by butting against each point of the lower wall of the canal. The instrument of M. Tanchou being formed in its vesical third of a series of small articulated pieces, which allow of its being introduced curved, and of its being straightened when in its place without making the slightest friction, would be evidently preferable if the straightening of the urethra were a precaution of actual importance in such cases. An extreme degree of development in the prostate involves another inconvenience: it sometimes, as I have said farther back, transforms the bas fond and trigonus vesicalis into a deep cavity, where the stone cannot be always seized with facility, unless after the manner of M. Bégin, (*Elem. de Chir.*, 2e edit., Paris, 1838. p. 667,) we should prefer placing the patient on his knees and elbows. The fingers of the assistant or of the surgeon introduced into the rectum, in order to raise it up and to present it to the claws (*serres*) of the litholabe, would answer full as well, I conceive, as the little sac suggested by M. Tanchou, or the tampons, of whatever description they may be, which might be introduced above the anns.

C. *In women*, in whom M. Buret (*Bibl. Méd.*, 1828, t. II., p. 16) has succeeded by means of a simple stone-breaker, lithotrity is more easy than in man, and almost unattended with danger. As their urethra is large, distensible, short, destitute of curvature, prostate, or seminal orifices, it accommodates itself admirably to the introduction of the necessary instruments, and does not require as complete a pulverization of the calculus. Only they have more trouble in supporting and retaining the injections, which however are less necessary in a bladder which is naturally large, pliant, and, so to speak, exposed to view; so much so that M. Ségalas succeeded in re-

moving, in a little girl three years of age, and after a very few sittings, a calculus of large size, though no liquid could be kept up in the bladder. It must nevertheless be confessed, after what occurred in the patients operated upon by MM. Bancal, Civiale, Leroy, Breschet, &c., that as lithotomy in women rarely causes death in more than one case out of twenty or twenty-five, it would appear to be still less dangerous in them up to the present time than broiement.

D. The *curved instrument*, of M. Pravaz, (*Bull. de Fér.*, t. XVII., p. 264; *Gaz. Méd.*, 1833, p. 143,) M. Pamard, (*Ibid.*, t. XIX., p. 71,) or of M. Leroy, being intended for the same system of broiement as the apparatus whose application I have just described, do not require any other details for the operative manual. Their principal advantage consists in occasioning less annoyance to the urethra, and causing consequently less pain, and of penetrating with more facility into the bladder. As on the other hand they are less commodious than the others, for exploring the organ and for finding and seizing the stone, it is unnecessary if we adopt the process of perforations, to employ them in women. All other things being equal, the straight instruments are to be preferred for lithotripsy by perforation, evidemtly or concentric broiement; while the curved instruments are better adapted to ecrasement.

E. The instrument of *M. Jacobson* is one of the easiest to manipulate; there is not one which exposes less to the risk of wounding the bladder. As it consists of nothing more than a single articulated noose, and has neither hooks nor free points, it would be almost impossible for it to pinch up or perforate the walls of the bladder; so that we might if necessary use it without any previous injection. Its curvature renders its introduction as easy as that of an ordinary sound. The manner of opening it is very simple. The nut having been brought up to the end of the screw, the palm of the right hand is made to rest upon this extremity. We push upon it, and the jointed branch of the forceps immediately opens itself in the bladder, as if for the purpose of forming a racket circle, which is somewhat irregular, in consequence of the dorsal concavity on the other branch. We proceed in search of the calculus after the rules laid down above. When it has finally entered into the metallic circle, we act upon the screw first with the hand, in the same way as for shutting up a litholabe, and then upon the nut which is transformed into a quick screw, and which, by making the two halves of the stone-breaker act in the manner of two large files moving in a contrary direction upon the calculus, concentrates all its action on this last, and cannot fail of effecting the ecrasement. The various fragments which are thrown off, are subjected to the same researches and the same manœuvres. The surgeon has no need of any assistant, the patient experiences but little fatigue, and nothing prevents our repeating the sittings at short intervals. Finally, the position requires no other precautions than those of catheterism in general. Only that it is unfortunate that these advantages are counterbalanced by the greater difficulty of finding and seizing those stones that are small, and of satisfying ourselves whether they have or have not entered into the noose of the forceps, also by the impossibility of extracting any fragment of them, and by the pinching up of the pros-

tatic portion of the urethra, which is sometimes caused by the slipping of the branches.

F. *Forceps with two branches.*—The modern forceps, either those for percussion, those that have a volant or screw, or those that are intended only for simple ecrasement, may be employed with still greater facility than the instrument of M. Jacobson. As their extremity may be turned to the right or left or backwards, they enable us to seize the calculus in any of the recesses of the bladder. As they admit of being opened and shut without any effort, and with all the rapidity desirable, they do not require any support, and thus render the operation evidently more prompt. Their principal inconvenience is that of allowing the stone to escape from them with facility, and that of reducing the calculus into angular fragments, which disturb and irritate the bladder.

G. *M. Heurteloup*, for the purpose of extracting these fragments, makes use of a large and straight, or curved catheter, the species of die which forms the vesical extremity of which may be unscrewed at pleasure, and is designated by the name of *magasin*. Laterally, and at nearly an inch from its inner extremity, it has two large apertures, which are placed in front of each other. The other extremity is provided with a stopper box, (*boîte à bouchon*.) a fasset, to make injections, and a ring, to serve as a support to the fingers. The liquids, which by means of this instrument are thrown up into the bladder, bring with them as they return through the apertures, all such fragments whose size will admit of their passing through the instrument. Those which are of larger dimensions are arrested in its apertures. The author then makes use of a jointed stilette, and which is flexible like the lithotritor of M. Pravaz, in order to break or crush the projecting portion of the stone, and to crowd it to the bottom of the magazine of the catheter, while the other portion of the calculus falls back again into the bladder. When after the repetition of this manipulation a greater or less number of times, the magazine is found to be filled, the instrument is withdrawn, in order to unscrew and to empty and reintroduce it, in order to repeat the manipulation if it is deemed advisable. M. Leroy alleges that this object can be still better accomplished by means of an instrument of the same kind, but in which the central stem can act at the same time both by pressure and rotation. Without rejecting in an absolute manner the aid of such instruments, we nevertheless feel compelled to avow that their probable advantages are not so evident as to induce practitioners to be anxious to adopt them, or to substitute them for, or even to associate them with, the other instruments already known.

### § III.—Comparative examination of lithotomy and lithotrity.

The broiement of the stone was scarcely invented, when its partisans gave it out as an operation altogether innocent and devoid of danger. Some, moreover, have considered that it was of such a nature, that it would one day enable us to dispense with lithotomy in surgical practice. The public has been deceived in both these respects. Lithotrity, such as it is now practised, is in the aggregate

still an operation in many instances more painful and more tedious than cystotomy; I have seen patients, and among others one who was operated upon by M. Souberbielle, after having been treated by M. Civiale, affirm that one single essay at broiement gave them more suffering than all the manipulations of lithotomy. A fourth, if not a third even, of the individuals upon whom lithotropy is performed, experience accidents, and it is not true that it never results in death. Out of 82 calculous patients mentioned by M. Civiale, 31 succumbed at the expiration of a year, and 19 others were not restored until after having experienced a certain number of accidents. Out of forty M. Leroy was not enabled to effect the radical cure of more than 25. Out of 10 M. Bancal accomplished it in only 2 instances, &c.; so that among a selected number of patients, there dies at least one out of every 10 or 12, and if we take an aggregate of calculous patients, some of whom are subjected to lithotropy, others to lithotomy, or left to the resources of the system, there will perish at least, a sixth or eighth part of them. Lithotomy, if examined in this point of view alone, will, nevertheless, always be still the most alarming, and the enthusiasts of broiement have no need of blackening the catalogue which relates to this operation, to disgust the public with it, and deter patients from submitting to it. Although authentic details show, that out of 812 persons operated upon at the Hotel Dieu and La Charité, in Paris, 255 perished, between the 31st of December, 1719, and the 1st of January, 1728, other facts demonstrate, that out of 213 Cheselden lost but 24. Though M. Sanson says that he has seen 6 perish out of 20, Dupuytren, nearly at the same epoch, had operated upon 26 patients before he lost a single one, and M. Dudley of the Transylvania University, met with the same success out of 72 patients. Without admitting the astonishing cures imputed by some persons to Raw, and without conceding that this surgeon was enabled to succeed in 1500 operations in succession, instead of affirming only, that out of the totality of patients operated upon by him, he had effected 1500 cures, it appears certain at least, that Martineau lost but 2 out of 84; M. Pansa, of Naples, 5 out of 66, Pouteau 2 out of 80, Lecat 3 out of 63, M. Pajola, of Venice, about the same proportion, M. Viricel, of Lyons, 3 out of 83, M. Ouvrard, of Dijon, 3 out of 60, Saucerotte 1 out of 60, and that Deschamps, at one period, succeeded in effecting 19 cures in succession. It is true that these facts are but imperfect. The same practitioners have not always been so fortunate; but why should it not be the same with lithotropy? Senac had reason for saying that the greater portion of patients operated upon for lithotomy in the hospitals of Paris perished, since out of 29 in 1725, at La Charité, 16 succumbed. Another person, however, would not have been wrong in asserting that there died but one only out of 8 or 9 cases, for in the same establishment 22 were cured out of 25, in 1727, and 23 out of 26, in 1720; which, however, did not prevent Morand from ascertaining that in this hospital 71 perished out of 208 operated upon during the space of 8 years, while at the Hotel Dieu, in the same space of time 18 only succumbed out of 594. Though M. Souberbielle lost 18 out of 52, in 1824 and 1825, his average proportion was not less than one out of every 6 or 8 operations. Though M. Richerand has considered that the failures and cures

balance each other equally at the beginning of this century, MM. Roux and Dupuytren have set them down in the proportion of 1 out of 5 to 6.

The following is what is exhibited by the best accredited statistical tables which have been published since the year 1810: At Norwich, out of 506 there were 70 deaths; at Leeds, 28 deaths out of 197 persons operated upon; at Bristol, 1 out of 4 and a quarter; at Lunéville, 1 out of 14; and in the table of Dupuytren, which comprises Paris and its environs, there were since the year 1820, 61 deaths out of 356 operated upon, that is, one out of every six. Thus lithotomy causes death in one case out of every 6 or 7 operations and no more. Lithotrity I am convinced is less fatal; it would be necessary however, to know to what extent, but experience has not yet enabled us to decide on this matter. In order to determine this question there is one condition which conscientious persons should not lose sight of, which is this, that individuals who can be operated upon by lithotrity are precisely those in whom lithotomy would succeed the best; while almost all those patients in whom broiement would be inapplicable, have also fewer chances of being cured by lithotomy. The solution of the problem therefore would not be final, unless we should select several hundreds of calculous patients for lithotrity, with the view of afterwards dividing them into two equal parts, one of which should be submitted to lithotomy and the other to lithotrity.

Even though lithotrity should be attended with still less danger, it could not be applied to all cases. Those calculi which have for their centre a metallic body, pin, needle, ball, &c., or for their nucleus a fragment of wood, horn or ivory, would in general be unsuitable for lithotrity. An Italian surgeon completely failed in endeavoring to break up a calculus the nucleus of which was formed by a fragment of the pith of wood, (Pétrequin, *Gaz. Méd.*, 1837, No. 42,) and M. Leroy, (*Rev. Méd.*, 1836, t. I., p. 50,) in a case where the stone had formed upon a stem of wood, did not succeed until after a number of trials. I should however add, that M. Cazenave found five sittings sufficient (*Gaz. Méd.*, 1838, p. 186) to break up and extract a calculus which had become encrusted upon an ear of wheat. The same difficulty occurs with encysted or adherent calculi, or those which have become in any manner whatever immovable, those which are exceedingly hard and which exceed the dimensions of a pullet's egg, and upon which the bladder is constantly applied, also in individuals who have the urethra deformed, either from birth, (as in epispadias and hypospadias,) or in consequence of disease, and to such extent as to render the employment of suitable instruments a matter of too great difficulty. M. Franc, (*Ext. des Calculs*, p. 6,) who proposes when the urethra is diseased or contracted, that we should have recourse to lithotrity at the hypogastrium, and who, like M. Dudon, advises that we should for this purpose make use of a trochar armed with a large canula, in order to be enabled to introduce by that means the suitable instruments required of as large size as possible, calls to his aid in this manner an operation which is more dangerous than lithotomy. A great number of calculi, a considerable degree of congestion in the prostate, or an ancient diseased condition and *racornissement* of the bladder, would in the majority of cases make the operation of

lithotomy at least as dangerous as lithotomy. Its advantages in the other cases appear to me to be indisputable, except in infants, and especially useful in those cases in which the patient is possessed of a certain degree of fortitude and docility, and an irritability sufficiently obtuse to support the various manipulations without fear, and also in those cases where the patient has a sufficient repugnance to cutting instruments to induce him to resign himself without difficulty to the prospect of being relieved at the expiration of a greater or less length of time, and where he can endure the introduction of the lithotritic apparatus as often as it shall become necessary for the purpose of destroying the stone. Though the return of the disease is much more probable than after cystotomy, because of the fragments of calculus which must frequently escape the most minute researches, we should not however hesitate in having recourse to it, when there is reason to believe that two, three, four, five or six sittings will prove sufficient. Lithotomy therefore is incomparably the most alarming of the two. By it, it is true, the stone is more rapidly and more perfectly removed, and the sufferings, so to speak, are momentary; but the patient nevertheless is obliged to keep his bed or chamber during the space of twenty or thirty days, while lithotomy, with the exception of the sittings, scarcely interferes with his customary occupations.

A. *Statistics of Lithotomy and Lithotritry.—I. Lithotritry.*—At the present day, which is eight years since the publication of the preceding remarks, it is still almost impossible to come to any other judgment on the appreciation of lithotritry. Its results have been given with so much partiality that science, in this matter, will have to be almost completely reconstructed.

a. When, for example, we analyze carefully the facts taken from the practice of M. Civiale, who considers that he has lost but six patients out of more than two hundred, we find the following result:

1st. For a first series of 83 calculous patients, we have 41 cured and 39 dead in the course of a year, and 3 who retained their stone.

2nd series, 24 patients, 13 cures, 11 deaths.

3d " 53 " 30 " 15 " 8 retained their

4th " 30 " 18 " 8 " 4 [stone.

5th " 16 " 6 " 7 " 3 "

or out of an aggregate of :

6th 429 patients, 268 cures, 161 not cured.

As M. Civiale has complained of this calculation, I have re-examined his observations separately, one by one, and obtained the following result from his first table:

1st observation.	The size of the stone not mentioned ; cured.
2nd " "	Stone friable and small ; cured.
3d " "	Size of a nut ; cured.
4th " "	Size of a nut and friable ; operation difficult ; cured.
5th " "	Size of an almond ; operation difficult ; orchitis ; cured.

6th observation.		Size of a small egg ; dead.
7th	"	Size of a nut ; fever and accidents ; cured.
8th	"	Stone friable ; difficult ; disease returned.
9th	"	Size of an almond ; dead.
10th	"	Two calculi ; cured.
11th	"	Size of a small nut ; cured.
12th	"	Small and friable ; woman ; cured.
13th	"	16 calculi ; three months of treatment ; cured.
14th	"	Size of small egg ; cured.
15th	"	Size of nut ; returned, and died one year after.
16th	"	Stone flattened ; cured.
17th	"	Several stones ; cured ; difficult .
18th	"	Size of almond ; cured.
19th	"	Friable ; returned ; died one year after.
20th	"	Size of an egg ; cured.
21st	"	Several stones ; cured.
22nd	"	Large, friable ; died in a month.
23d	"	Several small calculi ; cured.
24th	"	Several stones ; died two months after ; re-tention of urine.
25th	"	Nut ; friable ; cured.
26th	"	Large stone ; operation difficult ; cured.
27th	"	Large and friable ; cured.
28th	"	Nut ; cured.
29th	"	Many ; treatment of several months ; cured.
30th	"	Small, friable ; cured.
31st	"	Small ; cured.
32nd	"	Nut ; difficult ; cured.
33d	"	Small, friable ; died three months after.
34th	"	Small.
35th	"	Nut ; two months of treatment ; cured.
36th	"	Many ; size of a nut ; 2 mos. treatment ; cured.
37th	"	Medium size ; treatment tedious ; cured
38th	"	12 lines ; cured.
39th	"	Friable ; cured.
40th	"	Medium size ; returned.
41st	"	Voluminous ; cured.
42nd	"	Small ; cured.
43d	"	" " "

Other facts which M. Civiale does not take into consideration, have nevertheless a certain degree of value ; I extract them from his book :

Page xxxiv.	Gervais. Essays ?	Lithotomy performed.	Dead.
" xxxv.		Stone 5 ounces.	"
" "	Baticle ; preparatives and lithotomy performed.		"
" "	Count de Bourdon ; stone broken up ; lithotomy performed.		"
" xli.	Admiral Leroy ; lithotomy performed.		"
" xlii.	Bonleu ; <i>explored</i> ; " " "		"
" xliii.	Demaussé ; " " "		"
" xliv.	Bellefond ; " " "		"

Page			Dead.
	xii.	Pallu.	"
"	xiii.	De Tascher : broken up.	"
"	"	Diernot ;	"
"	xiv.	Montessu ; explored.	"
"	xvi.	Combes.	"
"	xvii.	Desrenaudes.	"
"	xviii.	Vincent ; broken up.	"
"	xix.	Chevals ; died during the preparatory treatment.	"
"	xx.	Fayau ; broken up.	"
"	xxi.	Regnauld.	"
"	xxii.	Faure ; broken up.	"
"	"	N. ; explored.	"
"	lviii.	Labat ; attempt to break up.	"
"	lxv.	Chetelal ; explored.	"
"	cxlvi.	Farder.	"
"	clvii.	Aumont ; broken up.	"
"	clix.	Quartara ; essays.	"
"	clxxiii.	Balet ; broken up.	"
"	clxxxix.	Violance ; "	"
"	clxxxii.	Huet ; "	"
"	clxxxiii.	Lebaigue ; "	"
"	clxxxviii.	Azille ; "	"
"	xxviii.	Provosty, a physician ; explored.	"
"	xx.	Dallery.	"
"	xxxii.	Leblanc Lavalliere ; essays.	"
"	ccxv.	Carpenter ; broken up.	"
"	cciv.	Jule Perin.	"

As for the rest I have made use of subsequent publications of M. Civiale, M. Larey, M. Double and M. Ledain, and valuable information which has been furnished me by ocular witnesses, or which I have myself taken on the spot.

b. Without measuring by the same rule the successes announced by M. Heurteloup, who states that he has succeeded 37 times in 38 patients ; by M. Leroy who lost only 11 out of 116 operations ; and by M. Bancal who, in 1838, lost but one out of 23, it is nevertheless allowable not to take literally the statements of those gentlemen. The English journals of medicine, in fact, together with the letters of M. Key and of M. B. Cooper and M. Tarral, as also the lectures of MM. Brodie, Liston and Chas. Bell, show that several of the patients of M. Heurteloup had deceived the operator, and that they were not cured when their cases were published. In the twelve cases of lithotomy taken by M. Doubowitzki, (*Reprod. Fid. des Discuss., &c.*, 1835,) from the practice of M. Amussat, we find five positive cases of cure, four of doubtful success, and three instances of death. Though M. Amussat has formally denied this, it is certain that the Count D'Auxi, among others, died after the expiration of a few months without ever having ceased to suffer, and that there were still remaining three or four small calculi with *facettes* in his bladder. The patient operated upon by M. Civiale at Florence in 1835, was not cured. At the Neckar Hospital, at the same period, there died at least two out of six or eight. A merchant of Lyon, a patient from

Anjou, another from the country, two from the department of Seine and Oise, the husband of a midwife at Paris, a printer, a patient of M. Roux, two of mine, one of M. Lenoir, the English Colonel Rankin, another personage of the same country, a case operated upon by M. Attenbury, a patient of M. Olknow, one of M. Colliex, and one of M. Norris, and others also have alike succumbed under the operation of lithotomy. It would be therefore, I repeat, to abuse the public, to give out this operation as destitute of every kind of danger. M. Bancal having 53 calculous patients to treat, (*Clin. Civil., &c.*, Bordeaux, 1839, in 8vo,) attempted broiement in 30; 22 were cured, 7 gave it up, and 1 died. They were of the following ages: 72, 60, 78, 74, 45, 66, 59, 40, 70, 35, 68, 34, 70, 72, 70, 37, 52, 64, 77, 74, 63, 52, 76, 75, 55, 52, 32, 60, 56, and 78. Twenty-three patients were subjected by this practitioner to lithotomy: 6 died and 17 were cured. Those who survived were of the following ages: 77 (with 55 calculi), 70 (3 calculi), 50 (1 calculus), 69 (1 calc.), 70 (3 calc.), 68 (8 calc.), 50 (1 calc.), 72 (1 calc.), 66 (1 calc.), 60 (1 calc.), 70 (25 fragments by the lithotritor), 32 (1 calc.), 70 (7 calc.), 60 (7 calc.), 6 (1 calc.), 10 (1 calc.), and 68 (15 calc.). The ages of those who died were: 80 (3 large calculi), 22 (1 large calc.), 56 (2 large calc. and the bladder bilobate), 84 (10 calc.), 66 (1 large calc.), and 58 (1 large calc.); from whence it appears that in 22 it was practicable to perform lithotomy to the end of the treatment, while 31 had to be subjected to another course of remedies. But this table scarcely accords with the first publication of M. Bancal, since, out of 13 patients whom he then mentioned, 4 of them died, one or two were cured, and 7 gave up the process. M. Randolph, (*American Journ. of Med. Sciences*, Nov. 1834, '36,) who asserts that he has performed lithotomy 13 times successfully, does not declare that he has never failed in it. In a patient in whom lithotomy was attempted with a percussor, which made a false track, it resulted in death and became in this way the subject of an inquest in England, on the part of the College of Surgeons, (*Gaz. Méd.*, 1837, p. 676.) With M. Tonellé however, (*Precis Méd. d'Indre et Loire*, 1838, p. 83,) who has already performed this operation a great number of times with success, three sittings were found sufficient to relieve a patient of a stone as large as an egg. M. Breschet also (*Gaz. Méd.*, 1838, p. 184) made use of lithotomy successfully in a woman who had suffered for the space of eight months. It has also been performed with success by M. Bonfils, (*Trans. Méd.*, t. XI., p. 264,) M. Liston, (*Bull. de Fér.*, t. XVII., p. 400,) M. Wattemann, (*Ibid.*, t. XVI., p. 440; t. XVIII., p. 73,) M. Randolph, (*Account of six cases, &c.*, 1834; *American Journ. of Med. Sc.*,) M. Depeyre, (*New York Med. Journ.*, February, 1831,) M. Cazenave, (*Oper. de Lithotrit.*, &c., 1837,) and MM. P. Guersant, Blandin, Sanson and Payan; but a patient, who was operated upon by M. Castara, (*Journ. des Conn. Méd.-Chir.*, t. III., p. 368,) died from cystitis, and that of M. Lallemand (Lafosse, *Clin. de Montpellier*, &c., p. 19) from purulent infection.

c. In what relates to myself, I count up to the present time (May, 1839) but twelve cases in lithotomy:

1. Man; 55 years; calculus size of a large nut; two sittings;

calculus badly seized; pains quite acute, which vexed the patient, and he went to a specialty practitioner; straight instruments; 1827.

2. Man; 32 years; calculus like a small nut; seized and broken up in one sitting; litholabe with three branches; 1829.

3. Man; 61 years; calculus size of a large nut; perineum painful; cystitis distinctly pronounced; an essay with M. Sirhenry's forceps; urinous collections; nephritis; death; ulcerated urethra; kidneys in state of suppuration; 1831.

4. Man; 58 years; calculus flat; fruitless attempt with M. Tan-chou's instrument; patient cut and cured; two inches and a half in the great diameter of the calculus; 1831.

5. Man; same age; ineffectual attempt with the apparatus of M Pravaz; no accident; cut; cured; 1832.

6. Man; 57 years of age; calculus like a small egg; thirteen sittings; success; instrument of Jacobson; 1834.

7. Man; 65 years; calculus of moderate size; six sittings; success; instrument of Jacobson; 1834.

8. Man; 68 years; size of large nut; three easy sittings; cystitis; acute nephritis; death; 13 fragments in the bladder; instrument of Jacobson; 1834.

9. Man; 58 years; size of pallet's egg; seventeen sittings; success; Heurteloup's pressure forceps, with screw and volant; 1835.

10. Man; 54 years; numerous stones; prostate diseased; will undergo lithotripsy at any hazard; four easy sittings; 60 fragments expelled; cystitis; nephritis; death; 73 calculi intact; 95 fragments; fungus of the prostate, and kidney in suppuration; Heurte-loup's instrument as modified, tried once; Jacobson's brise-pierre three times: 1836.

11. Man; 69 years; calculus like a small nut; three sittings rapid success; pignon forceps; 1837.

12. Young man; 20 years; calculus size of an egg; does not wish to be cut on any account; first attempt easy; stone broke twice with the pignon litholabe. Second attempt—patient extremely intractable; violent and incessant contractions of the bladder; sudden erections of the penis on the slightest movements of the forceps. Third and fourth attempt fully as ineffectual; lithotomy performed; success prompt; 1837.

In examining the results furnished by lithotomy in different countries, M. Civiale, it is seen, has singularly imbrunated the table, so that on this point, as well as in what relates to broiement, the works of this practitioner, from the first to the last, are only calculated to mislead the reader into the strangest delusions.

II. *Lithotomy*.—The following now is what the tables furnish in respect to lithotomy.

M. DUDLEY, (*The Lancet*, 1838, vol. II., p. 307—*London Med. Gaz.*, June, 1837, p. 448—*Transylvania Journal*, &c., vol. X., p. 91.) Out of 148 patients, 10 refused to be operated upon. Out of 138 operated upon, 131 were cured; 4 died, 1 of pleurisy, 2 of nephritis, 1 of disease of the liver, though the wound had cicatrized; and 3 had a fistula succeed to the operation.

BRETT, (*Kleinert's Repertoire*, March, 1835, p. 163.) In India out of 22 cases of operation, 4 patients died from exhaustion.

CLOT, (*Compte Rendu d'Abouzabel*, 1832, p. 49.) Out of an aggregate of 58 patients, 6 died.

PANSA, (Naples, 1827, *Bull. de Fér.*, t. XV., p. 66.) 32 cases, 5 deaths.

KERN, (*Bull. de Fér.*, t. XV., p. 64.) Lateral method; 334 cases and 31 deaths.

BURNARD, (*Arch. Gén. de Méd.*, 2e ser., t. I., p. 427.) At the Hospital of Benares at Bengal; out of 22 operated upon, 5 deaths.

CHESELDEN,	213	operated upon,	24	deaths.
POUTEAU,	80	"	2	"
MARTINEAU,	84	"	2	"
SAUCEROTTE,	60	"	1	"
DESCHAMPS,	20	"	1	"
VIRICEL,	83	"	3	"
OUVRARD,	60	"	3	"
PAJOLA,	50	"	5	"
DUPUYTREN,	27	"	1	"
"	70	"	6	"
MEJEAN,	105	"	1	"
DELMAS,	11	"	1	"

*Hotel Dieu, and Charité*, from 1719 to 1728, 812 operated upon, 251 dead.

At *Lunéville*, for the same period, 1629 operated on, 147 dead.

CROSS, at Norfolk and Norwich, mentions 704 calculous patients, of whom there were:

Men,	669	cases,	478	cures,	91	deaths.
Women,	35	"	33	"	2	"
At Leeds,	197	"	33	"	28	"

At *Naples*, (De Renzi, *Gaz. Méd.*, 1835, p. 217,) in fourteen years:

	440	cases,	375	cures,	65	deaths.
PETRUNTI,	25	"	24	"	1	"
SANTORO,	56	"			1	"
SMITH,	17	"				
SOUBERBIELLE,	133	"			17	"
F. JACQUES,	60	"	at Brussels,		no deaths	
"	38	"	Versailles,		"	"
"	50	"	Angers,		2	"
"	23	"	Hotel de Lorges,	1	"	
F. CÔME,	100	"	81 cures,	19	"	
CHELIUS,	22	"			1	"
MOTT,	50	"			1	"

b. Out of 1411 calculous patients, received into the Hospital of Ste. Marie at Moscow, from the year 1808 to 1836, there were 411 operated upon from 1829 to 1837. Out of these last 369 were cured; 41 were not cured at the time of their leaving; 42 succumbed; 17 died without being operated upon; 46 were from 15 to 62 years of age, and 323 between 1 and 16 years; 11 of the first succumbed, and 31 of the second. M. Roos, (*Gaz. Méd.*, 1838, p. 810,) says nothing of those that were operated upon before the

year 1830. According to M. Franc, on the contrary, (*Extrait des Calculs, &c.*, p. 10,) who has frequented the hospitals of Montpellier, out of those operated on by lithotomy, as many die as are cured. It must be admitted, however, that the accuracy of these proportions is not placed beyond all dispute, and that the facts which serve as their basis, are not accompanied with all the details that are desirable. The series given by M. Cross is one of the best which we possess. Out of 704 patients mentioned by him there were :

Children from 1 to 10 years,	281 cases,	262 cures,	19 deaths.
" 11 " 20 "	106 "	97 "	9 "
Adults " 21 " 50 "	143 "	125 "	18 "
" " 50 " 80 "	174 "	127 "	47 "

c. *The weight of calculi.*—Out of 271 patients in whom the calculus weighed more than 5 gros, 215 were cured and 56 perished. Out of 529 in whom the calculus weighed less than an ounce, 47 succumbed and 482 were cured. Being desirous of ascertaining if it was possible to estimate the dimensions of a calculus by means of its weight, I took several of those that are in the museum of the Faculty of Medicine, and after having requested M. A. Thillaye to examine them, I obtained the following facts :

1st. The calculus of a flattened ovoid shape, was formed of uric acid.

The great axis was 42 millemetres, or 19 lines.

small axis " 33 " 1 inch and 3 lines.

thickness " 21 " 9 lines and half.

weight of this calculus 21 grammes, or 5 gros and 36 grains.

2d. Calculus of a flattened ovoid form, (uric acid ?)

37 millemetres in one diameter, or  $19\frac{1}{2}$  lines.

31 " another "  $13\frac{3}{4}$  "

Thickness 25 millemetres, or  $11\frac{1}{4}$  "

Weight of this calculus 19 grammes, 6., or 5 gros, 8 grs.

3d. The calculus mural of spherical form and covered with asperities, (composed of oxalate of lime.)

Diameter 39 millemetres, or  $20\frac{1}{2}$  lines.

Weight 46 grammes, 6., or 1 ounce, 4 gros and 13 grs.

From whence it follows that every calculus of half an ounce in weight ought to have nearly an inch in diameter.

d. I owe to the politeness of M. Castara, an unpublished table, which is still more valuable than that of M. Cross, and which I present on the following pages. It relates to the patients operated upon at Lunèville, from the year 1738 to 1828, and must be received as a guide or supplement to that of Saucerotte.

*Hospital of Lunéville.*

Age.	Number of calculous patients operated upon.	Sex.		Deaths.		Mortality among Males.	Mortality among Females.	Mortality in the two sexes.	Operated on a second time.
		Males.	Females.	Males.	Females.				
2 to 3	18	17	1	3		1 in 5 2-3		1 in 6	2 1 after 1 year 1 after 3 years.
3 " 4	82	79	3	4		1 " 19 3-4		1 " 20 1-2	2 1 " 6 mos. 1 " 3 "
4 " 5	135	131	4	8		1 " 7 5-8		1 " 7 1-2	2 1 " 6 mos. 1 " 4 "
5 " 6	145	141	4	10	1	1 " 17 5-8	1 in 4	1 " 15 2-3	2 1 " 6 mos. 1 " 4 "
6 " 7	144	139	5	16		1 " 13 9-10		1 " 14 2-3	
7 " 8	119	113	6	5		1 " 18 5-6		1 " 19 5-6	
8 " 9	119	116	3	0		1 " 23 2-5		1 " 23 4-5	1 after 2 years.
9 " 10	88	84	4	11		1 " 8 2-5		1 " 8 4-5	2 " 6 mos. 1 " 9 "
10 " 11	76	73	3	13		1 " 6 7-12		1 " 6 10-11	
11 " 12	52	49	3	6		1 " 16 1-3		1 " 17 4-3	1 " 2 years.
12 " 13	72	70	2	6		1 " 11 2-3		1 " 12	1 " 6 mos.
13	52	48	4			1 " 8		1 " 8 2-3	
14	28	27	1	2		1 " 27			" 27
15	36	34	2	4		1 " 17		1 " 18	
16	36	35	1	5		1 " 8 3-4		1 " 9	
17	30	30	9			1 " 6		1 " 6	
18	33	33	2			1 " 3 2-3		1 " 3 2-3	
19	20	20	4			1 " 10		1 " 10	
20	20	20				1 " 5		1 " 5	
21	14	14	3			1 " 14		1 " 14	
22	15	15	2			1 " 5		1 " 8 1-2	
23	17	15	2	2		1 " 7 1-2		1 " 8 1-2	
24	12	11	1			1 " 5 1-2		1 " 7	
25	7	5	2	1		1 " 5		1 " 7	
26	7	6	1	1		1 " 6		1 " 3 1-2	
27	7	7		2		1 " 3 1-2		1 " 6	
28	6	6		1		1 " 6		1 " 6	
29	6	6		1		1 " 6		1 " 2 1-2	
30	5	4	1			1 " 2		1 " 3	
31	3	2	1			1 " 2		1 " 3	
32	3	3		1		1 " 3		1 " 3	
33	3	3		1		1 " 3		1 " 1 1-3	
34	4	3	1	2	1	1 " 1 1-2	1 in 1	1 " 5	
35	5	5				1 " 5		1 " 6	
36	6	5	1	1		1 " 5		1 " 2	
38	4	4		2	1	1 " 2		1 " 3	
39	3	3				1 " 3		1 " 5	
40	5	4	1			1 " 4			" 2
41	2	2				1 " 2			" 2
42	2	2				1 " 2			" 4
43	2	2				1 " 2		1 " 2	
44	2	2				1 " 2			" 2
45	4	3	1	2		1 " 3			" 2
46	4	4				1 " 1			" 1
47	1	1				1 " 1			" 4
50	4	4				1 " 4			" 1
51	1	1		1		1 " 1		1 " 1	
52	1	1				1 " 1			" 2
53	2	2				1 " 2			" 3
54	3	2	1	1		1 " 2		1 " 4	
56	4	4		1		1 " 4		1 " 2	
58	2	2				1 " 2		1 " 1	
56	1	1				1 " 1			" 2
60	2	2		1		1 " 2		1 " 2	
61	2	2				1 " 2			" 2
62	1	1				1 " 2			" 3
63	3	3		1		1 " 3		1 " 1	
64	1	1				1 " 1			" 1
65	1	1				1 " 1			" 2
66	2	2				1 " 2			" 1
68	1	1				1 " 1			" 2
70	3	3		1		1 " 2		1 " 2	
73	2	2				1 " 2			" 1
74	1	1				1 " 1			" 1
76	"	1				1 " 1			" 1
78	1	1				1 " 1			" 1
Total,	1492	1433	59	148	2	1 in 9 101-148	1.29 1-2	1 in 9 71-75	

Strictly speaking we ought not here to include in the necrology of cystotomy three patients operated upon, who died, one on the 21st day after the operation, from a confluent small-pox; the second at the end of a month, from an abscess in the kidneys and colliquative diarrhea; the last on the third day, but in a state of marasmus, with the kidneys and lungs in a state of suppuration.

On making the post-mortem examination of a child 8 years of age, a calculus was found in the urachus of a different nature from the one extracted from the bladder.

*Table of Operations in Private Practice.*

Age.	Number of calcu- lous patients operated upon.	Sex.		Deaths.		Mortality among Males.	Mortality among Fe- males.	Mortality in the two sexes.	Operated on a second time.
		Males.	Females.	Males.	Females.				
5 to 1½	1	1							
5 " 6	4	4	—	—	—				1 a year after.
6 " 7	5	5							
7 " 8	6	4	2	—	—				
8 " 10	4	3	1	—	—				1 a year after.
10	2	2							
11	1	1							
12	1	1							
13	2	1	1						
17	1		1						
19	1	1							
20	2	1	1						
22	1	1		1					
24	1	1							
25	1	1							
30	1		1		1*				
36	1	1		1					one year after.
40	2	2		—					
45	1		1						8 months after.
50	2	2							
51	1	1							
55	1	1							
60	1	1							
62	1	1							
65	1	1		1†					
68	1		1						
Total,	46	37	9	3	1				

\* We would remark that this woman died from phthisis pulmonalis, the 30th day after the operation.

† This old man, who had suffered for a long time, was exhausted by fever and diarrhoea; his bladder was much affected. He sunk quietly a month after having been operated on. The operations on the males were performed with the improved gorget of Hawkins, save one, who was operated on by the recto-vesical method. Of the nine female patients, five were operated on by the bi-transverse incision of the urethra and neck of the bladder, three by the vertical incision, and one by the vagina. An old man of 62 years of age, and a woman of 68, remained with incontinence of urine.

e. M. Castara adds, that out of 1433 patients of the male sex, 1103 were operated upon by the method of Marianus, or that of the great operation ; of these 119 perished, which makes the mortality 1 in every  $9\frac{3}{9}$  parts, while 7 had fistulas follow. There were 330 cut with the improved gorget of Hawkins; out of these 29 perished, or 1 in every  $11\frac{3}{100}$ , and 3 had fistulas. Out of 59 of the female sex operated upon, it was effected by dilatation of the urethra in 50 cases ; there were 2 died, and 9 were submitted to the bi-transverse incision of the urethra and neck of the bladder. The majority of these calculous patients were furnished by the towns and communes situated to the south in the Department of La Meurthe. Their frequency appears to have diminished in this department. The town of Luneville furnished between the years 1738 and 1828, 90 cases, of whom 6 died in consequence of the operation.

- |   |                 |
|---|-----------------|
| 1st. In a period of 30 years, 56, or 1 and $\frac{1}{5}$ per annum. |                 |
| 2d. In a second period, 30, or 1                                    | "               |
| 3d. Finally, in a third period, 4, or                               | $\frac{2}{5}$ " |

From whence it follows that there has taken place a diminution of  $\frac{1}{3}$  in every period of 30 years. It will be remarked, says M. Castara, that the table published by Saucerotte differs from mine in respect to the number upon whom lithotomy was performed, and in what relates to the results of the operation. The registers of lithotomy in our hospital do not go back beyond the year 1738. I have made an exact transcript of them. I have myself collated the copy with the original, and with those documents which came into my possession from my ancestor, Sebastian Castara, who was surgeon of the Hospital of San Jacques and lithotomist of the foundation of King Stanislaus, at the same time with Saucerotte. I have carefully abstracted quite a considerable number of patients, who were not operated upon, or who died before the operation, or who are found in this list only under the head of fistulous cases. It results from this, that from the year 1738 to 1828, there were but 1492 calculous patients operated upon, of whom 59 were of the female sex. I do not know where Saucerotte derived his information of an anterior date, but I am induced to believe that in his work he has fallen into a number of errors. He states that up to the time at which he wrote, there had been 1629 operated upon, and 683 after the time he became attached to the hospital as lithotomist. Now it was in the month of August, 1765, that he performed his first operation in lithotomy, and from that epoch to the date of his book in 1801, even if we include that year, there were but 653 operations ; of which 624 were on the male sex and 29 on the female. In the first there were 63 deaths, or 1 in  $9\frac{5}{3}$  operated upon ; in the other there were but two : the mortality in the two sexes united, is one out of every  $10\frac{3}{5}$ . It is in this catalogue that are found the 194 calculous patients operated upon by Saucerotte and his colleagues by means of the modified gorget. I consider however that we may reckon the cases at 196, and 12 deaths instead of 10, which gives a mortality of one out of every  $16\frac{1}{2}$ . I do not desire to depreciate the advantages of the cutting gorget, for it is the instrument to which I give the preference ; not Desault's modification, but the gorget which was

used by my grandfather and father, and which is quite similar to that of Scarpa. My only desire is to establish the facts and approach as near as possible to the truth. A mortality of 1 out of every 16, would still be a satisfactory result, in uniting together the persons operated upon at every age; but the statistics in this respect are based upon too small a number of observations to allow us always to hope for so favorable an issue. I find in fact a succession of 20, 30, and even 50 operations by the great operation, without encountering a single death. Could we conclude from thence that we should not lose but 1 out of every 20, 30, or 50, by the process of Marianus? Certainly such a result could not be possible. Failures immediately afterwards make their appearance, and soon destroy our hopes and dispel our illusions! With the desire of ascertaining the difference in the chances of success between the two operative processes, (Marianus and Hawkins,) I have divided into three periods of 30 years each, the space between the years 1738 and 1828. In the first there was no other than the great operation; the second embraces both methods; while the third, in fine, includes only those cases that were operated upon by the modified gorget, except two cases by recto-vesical lithotomy.

First period,	836	operated upon,	96	deaths, or 1 in every	$8\frac{5}{6}$
Second period,	538	"	45	"	$11\frac{4}{5}$
Third period,	118	"	9	"	$13\frac{1}{3}$

C. Like all those operations which some persons undertake to perform under the title of *speciality*, lithotritry soon became the object of mercenary speculations much more than it did the subject of researches purely scientific. From that time it became quite natural that they should make light of its inconveniences, at the same time that they exaggerated the dangers of lithotomy. Having seen performed, and having myself practised both the operations to a very considerable extent, I am enabled to compare their value in all their relations.

B. *Dangers of Lithotritry and Lithotomy.*—I. *The danger of lithotritry* is ascribable, even in the modern processes to :

a. *The pain*, which is sometimes very acute. Some persons exhibit more impatience under it than in lithotomy, and complain as much at each sitting, as they would from this last operation. This pain appears to be produced by the distension and the straightening of the urethra which the lithotritor, which necessarily occupies a straight position under the pubes, causes the patient to experience in the membranous and prostatic portions of this passage.

b. *To the nervous symptoms.*—Certain patients experience so much distress during the broiement, that such severe nervous symptoms are thereby speedily produced as to result occasionally in death. M. Larrey and M. Leroy have each given a case of this kind.

c. *To the fever.*—A fever, which shows itself under the form of an intermittent, is frequently the consequence of any attempt at lithotritry, whatever may be the method we adopt. It is frequently announced by chills and a violent trembling; the hot and afterwards the sweating stage arrive, and the accident may stop there, but it is not unusual to find a febrile pulse continue for two or three days.

*d. To the arthritis.*—Pains in the joints similar to rheumatism and which sometimes become the source of dangerous purulent arthropathy, in some cases succeed to these exacerbations of fever.

*e. To the urethritis.*—The irritation which lithotripsy leaves in the urethra frequently confines itself to the production of a slight blenorragic exhalation, which disappears in the course of two or three days. In some cases also the pain is so acute in the perineum as to occasion suffering when the urine is emitted, and to oblige us to defer the sitting to the expiration of a week or more.

*f. To abscesses of the prostate.*—When there has been very considerable contusion and pressure upon the urethra, the prostate itself may inflame and terminate in abscess. Instances of this result have been related by several practitioners.

*g. To the tearing and laceration of the urethra.*—The straightening which we are obliged to give to the curved portion of the urethra, frequently causes this passage to be excoriated, or torn, or lacerated, from whence is produced a sensation of burning, which is very painful at the time the urine and fragments of stone are passing through it.

*h. To the urinary infiltration,* which is almost a necessary consequence of the preceding accident.

*i. To the collections of the same nature,* which unavoidably follow upon the urinary infiltration, and the serious danger of which is well understood.

*j. To the orchitis,* which very frequently takes place, and which succeeds, as in blenorragic orchitis, to the irritation established in the prostatic region of the urethra, but which is not in general of long duration and does not always prevent our repeating the operation.

*k. To the phlebitis,* instances of which have been related by M. Leroy and some other practitioners, and which either as a cause or effect, is neither more nor less dangerous in this than it is in all other cases.

*l. To the cystitis,* which has been frequently observed and pointed out, and which is explained either by the repeated contact of the instruments, or by the angular condition of the fragments deposited in the bladder by the breaking up of the stone.

*m. To the perforations of the bladder,* even the possibility of which has been denied, but instances of which were noticed in the patient Turgot, and in other cases mentioned by MM. Breschet, Tan-chou, Bancal, &c.

*n. To wounds of the rectum,* which can scarcely exist without the preceding injury, and the least dangerous result from which would be a recto-vesical fistula.

*o. To the pinching up or lacerations of the mucous membrane of the neck or body of the bladder.* From being obliged to pass through a common sheath and to make friction against each other at their root near the calculus, the branches whether of the forceps with two branches, or the noose of Jacobson, or the straight litholabes, and in fact of all lithotritic instruments, expose to the risk of this inconvenience, which, whatever may be said to the contrary, frequently occurs, but fortunately is rarely attended with serious consequences.

*p.* To the hemorrhage, which apart from a slight exhalation from the urethra, but rarely takes place, but of which MM. Tanchou and Blandin alone, however, relate four instances in which it became of a serious character.

*q.* To the retention of urine, which is attributable to the irritation, congestion and lesions of every kind, which take place at the neck of the bladder and in the prostatic region of the urethra, or it may be owing to fragments of calculi which have become arrested under the pubes.

*r.* To the incontinence of urine, which arises from the contusion and distension of the same parts.

*s.* To the impotency, which is explained in the same manner from injuries to the ejaculatory ducts and their relations with the prostate.

*t.* To the fragments arrested in the urethra, sometimes behind the meatus, in the fossa navicularis, which is not serious, sometimes in the prostatic region, which is much more grave, and which frequently occasion excruciating pain, and the greatest degree of embarrassment.

*u.* To the fistulas of the rectum, perineum or urethra, which are nothing more than the results of some other lesion.

*v.* To the necessity of dilating certain contracted parts of the urethra, or that of incising its meatus.

*x.* To the inflammation of the ureters and kidneys, which is attributable to the same causes as the cystitis, and which is scarcely any other than an extension of this last, but is usually fatal.

*y.* To the peritonitis, of which instances are related by Dupuytren, MM. Tanchou, Leroy, &c.

*z.* To the instruments having got injured, or from their having been broken in the organs, an accident which happened in cases of MM. Leroy, Heurteloup, Hervez and Maunoury, and which in more than one instance has rendered lithotomy necessary, or resulted in death, as in the officer mentioned in the English Journals.

*aa.* To the sinking and the typhoid state of the patient, whether unaccompanied with any apparent serious lesions, or whether produced by purulent infection, which [typhoid state] is an accident that has been frequently observed, and which I myself have witnessed in a certain number of instances.

*bb.* To the return of the disease, which was seen in from 12 to 15 of the patients of M. Civiale, in France, and in nearly the same number among those who were operated upon in England; these last have been mentioned by MM. Chas. Bell, Liston, A. Cooper. Key, &c.

*cc.* To the difficulties of the operation, which are sometimes very great, in consequence of the sensibility, small calibre and diseased condition of the urethra or bladder, or in consequence of the indocility or want of reason on the part of the patient, as for example, in children.

*dd.* To the total duration of the operation, which is generally from six weeks to three months, and which may extend even to six months or a year.

II. *The accidents and danger of lithotomy* are especially ascribable:

*a.* To the hemorrhage, which is infinitely more common and more

dangerous than after lithotomy, and which is explained by the fact, that a certain number of vessels are unavoidably wounded.

*b.* To the *wounding* of the rectum, either by incision or by contusion, and which leaves a recto-vesical fistula as its consequence.

*c.* To the *peritonitis*, which takes place frequently, and which is almost always fatal.

*d.* To the *urinary infiltration*, and the inflammation of the cellular tissue of the pelvis, an accident which forms an exception in lithotomy, but is very common here.

*e.* To the *phlebitis and purulent infection*, which are also more common than after the broiement.

*f.* To the *perforation of the bladder*.

*g.* To the *cystitis*.

*h.* To the *sinking* of the patient.

*i.* To the *fistulas*, which are caused by the wound in the perineum or that of the rectum.

*j.* To the urinary and purulent infiltrations in the scrotum and perineum, but which are quite rare.

*k.* To the various kinds of erysipelas, which only occur as an exception, but which are not unattended with danger.

*l.* To the *incontinence and impotency*, which are scarcely more frequent after lithotomy than after lithotomy.

*m.* To the *nervous symptoms*, and which may prove fatal.

*n.* To the *pain*, which is acute but of short duration, so far as the operation is concerned ; as to the pain which is subsequently caused by the wound and passage of the urine, it is scarcely of a more serious character, than the painful sensation in the urethra after lithotomy.

*o.* To the *return of the disease*, which is almost impossible, except by the formation or arrival of another stone in the bladder, inasmuch as the surgeon may satisfy himself directly, both with the finger and the instruments, whether there is anything more remaining in the organ which he has just opened.

*p.* To the re-establishment of the course of the urine through the urethra, which is sometimes delayed to a long period.

*q.* To the necessity of keeping the patient in bed during the space of 20 to 30 days.

*r.* To the *necessity of a course of diet*, or of quite a severe regimen during the space of from 8 to 15 days.

*s.* To the *ureteritis, nephritis, orchitis, and collections in the prostate*, which are not less common here than after lithotomy.

We perceive by this parallel, that all things being balanced, lithotomy and lithotomy have but very few advantages over each other, in relation to the pain, nervous symptoms, inflammation of the urinary passages, incontinence and impotency, perforations of the bladder, and the sinking of the patient ; that the exacerbations of intermittent fever, the mild or purulent form of the arthritis, orchitis, abscesses in the prostate, lacerations of the urethra, pinching up of the bladder, infiltrations, external urinary deposits, retention of urine, calculi arrested in the urethra, the necessity of dilating or incising this canal, and the danger from instruments that have become injured or become broken in the organ, belong almost exclusively

to lithotrity ; that as a return of the disease may be caused by a portion of calculus overlooked in the bladder, it must be incomparably more frequent after lithotrity than after lithotomy ; but that lithotomy, while it is more exposed to the risk of fistulas, lesion of the rectum and phlebitis, is rendered more especially dangerous by hemorrhage, peritonitis, inflammation of the pelvis, and the necessity of establishing a wound, which requires a repose and regimen foreign to the habits of the patient.

III. From whence it follows, that *provided the bladder is sound, the urethra free, the patient of no more than ordinary sensibility, the calculus less than the size of an egg, and of a moderate degree of hardness,* lithotrity is in its aggregate less dangerous than lithotomy. Such is the formula which I supported in 1835 before the Royal Academy of Medicine, and which I have no reason at the present day to modify, whatever anxiety may have been evinced by a considerable number of busy-bodies to pervert it. This language, we will admit, scarcely corresponds with that of lithotritists, but I am convinced that it expresses the truth, and that after lithotrity has once been adopted into the common domain of surgery, it will find in this formula a more exact interpretation than it does in the *ipse dixit* of its interested partisans.

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## CHAPTER II.

### URINARY CALCULI EXTERNAL TO THE BLADDER.

#### ARTICLE I.—IN THE KIDNEY AND URETHRA.

##### § I.—*Nephrotomy.*

Science possesses numerous instances of calculi, which after having become arrested in the *kidney itself*, have there acquired a considerable degree of development, in such manner as to ultimately result in the death of the patient. From hence came the idea of nephrotomy, which may be described as an incision into the organ through the sound tissues, or the incision of a purulent collection over which we have been enabled to feel through the lumbar region ; or it may consist also of a simple enlargement of a renal fistula, with the view of favoring the escape or extraction of the foreign body. It cannot be denied that it would be possible to reach the kidney on its posterior side, between the last rib and the crest of the ilium on the one hand, and the sacro-lumbar mass and the posterior border of the oblique muscles on the other. I have many times laid it bare by following this process. Though it be next to impossible to satisfy ourselves by any physical means of the existence of the stone in the kidney ; though the reasonable signs of this should be deceptive ; though on the other hand after the presence of the calculus is once established, it may still be required to

know whether it occupies the entrance of the ureter or the pelvis, rather than the tissues of one of the walls of the organ; whether it is or is not accompanied with ulcerations, and purulent dissolution, or any disorganization whatever; finally, though we may be forced to renounce nephrotomy, so long as there is no point externally which indicates the locality upon which we should direct our researches, it is also certain that since the labors of M. Rayer, the diagnosis of calculi in the kidney is no longer a matter of such difficulty, and that the presence of a tumor in the flank, with a prominence in one of the lumbar regions, together with the signs of calculous nephritis, would authorize additional essays in nephrotomy. There is, moreover, no proof that this operation has ever been attempted. The passage which is quoted from Hippocrates in support of it, does not seem to have reference to it. Nor can the operation, performed upon the free archer, which has been so much spoken of, be deemed any longer of any weight in a question of this kind. What confidence in fact can we accord to this story, when we see that Mézerai makes this criminal come from Bagnolet, while Paré, who relates the circumstance from the chronicles of Monstrelet, makes him come from Meudon; when some authors state that he lived under Charles VII., and others under Louis XI.; when Collot and the author of the History of France believe that nephrotomy was performed upon him, while Rousset and Sprengel suppose that he was cut for stone by the high operation; when Méry, on the contrary, considers that he was cured by the perineal operation, while Tollet asserts that the only operation performed upon him was merely gastrotomy for a volvulus? The case of the consul Hobson (*Transact. Phil. Abr.*, vol. IV., p. 116,) who is stated to have been operated upon by Marchettis, is hardly more conclusive. Bernard, who relates it, had no other proof of the fact than the assertion of the patient and his wife, while Marchettis himself, in his *Observations Rares*, says not a word of it. It is to be hoped therefore that the discussions raised in the schools of surgery in 1754, by Masquelier and Bordeu, and by Cousinot a century before, to ascertain whether nephrotomy was or was not practicable, will not again be revived. The operation cannot, in reality, be proposed, except in a small number of cases, as in those in which the flank, which has become the seat of an evident fluctuation, after the existence of various signs of calculous affections in the kidney, would enable us to reach the morbid collection with facility and certainty; or in those cases also in which a fistulous ulcer should have enabled us to come into immediate contact with the stone by means of an exploring instrument; or finally, where the calculus itself projects at the exterior, and may be recognized through the integuments. In such cases the operation is so simple and is reduced to so small a matter, and has moreover to be modified by so many controlling circumstances, that it would be useless to describe it in detail. All that can be said is this, that after having made openings of sufficient extent, or enlarged those which already existed, by means of the bistoury alone, or by this instrument guided upon the director, we should search for the stone with caution, and in order to displace and extract it, make use either of the ordinary forceps, the polypus for-

ceps, hooks or scoops, or the dressing forceps, or the fingers alone. Lafitte, (*Mém. de l'Acad. de Chir.*, t. II., p. 170, 1819,) has very judiciously described the cases which may require this operation, and it might probably have been performed with advantage upon the patient mentioned by Billebaut, (*Acad. de Berlin*, t. IV., App., p. 32.) I have attempted it upon two calculous patients, and in both instances confined myself to the first stage, that is to say, that I stopped after making an opening into the vast lumbar abscess, and that the patients then finding themselves relieved, would no longer listen to an operation.

### § II.—*Ureterotomy.*

What I have said of calculi arrested in the kidney is applicable with still greater force to calculi lodged in the ureter. Though they might be retained in any part of the course of this duct, it is however in its upper third and near its vesical extremity that they are most frequently encountered. In the first position they may ulcerate the ureter, pass partially into the cellular tissue of the flank, and produce in that part an abscess which may, if necessary, be opened above the crest of the ilium, or this abscess may of itself open through this region. A patient who died almost suddenly, in 1831, in my department at La Pitié, presented to us a remarkable case which the reader will not perhaps be displeased to find here. The kidneys were perfectly sound, as well as the left ureter and the bladder, which contained no stone; but the right ureter, which was greatly dilated as far as to three inches below its origin, was perforated posteriorly by a calculus the size of a nut, which projected into its cavity, and made a prominence externally at the bottom of a purulent collection under the ascending colon. This calculus contained a pin in its centre, and appeared to have caused the thickening, induration, engorgement, and suppuration in the cellular tissue and muscles, which, from the kidney to the bottom of the pelvic cavity, spread to such extent as almost to close up entirely the lower strait of the pelvis. It is very certain, as I satisfied myself upon the dead body, that this stone might have been readily extracted by the flank on the same side. But who could have ascertained the certainty of its existence during the life of the patient, and who upon the strength of mere suppositions would have had the boldness to perform the operation required? The stone which M. Iliff (*Bull. de Fér.*, t. III., p. 287,) extracted through a fistula in the right groin,—had it escaped from the bladder or the ureter?

### ARTICLE II.—URETHRAL CALCULI.

#### § I.—*In the Tissue of the Vaginal Septum.*

Should a calculous concretion have developed itself between the urethra and vagina, an instance of which has been related by M. Macario, and should it have been possible in any manner whatever to have established its presence, its extraction might be effected by incising through the vulvo-uterine passage, and to the extent re-

quired, the entire thickness of the cyst which should separate it from the urethra.

### § II.—*In the Prostate.*

The gland which surrounds the commencement of the urethra quite frequently suppurates and ulcerates. The urine may become effused to a certain extent in the cavities thereby produced, and as in the patient of M. Lizars, (*Encyclogr. des Sc. Méd.*, 1836, p. 140,) deposite there small calculi which may acquire more or less considerable dimensions. In other cases the calculi become arrested and lodged exclusively in the natural dilatation of the canal which contains them. These calculi may either be pushed back into the bladder, or seized with a sheath forceps and extracted, or may be broken up in fragments and destroyed in the place which they occupy. The others, on the contrary, cannot be reached or seized through the urethra but with considerable difficulty. It is through the perineum that we are obliged to cut down upon them. The same is to be done for those which, as Dupuytren has remarked, (*Bull. de la Fac. de Méd.*, t. VII., p. 136,) are sometimes developed in the tissue of this region, whether, as has been noticed by M. Jacquier, (communicated by the author, 1839,) after an operation for lithotomy, from some fragments having been left in the wound, or that a small calculous mass may have escaped into the surrounding tissues through a laceration or ulceration in the urethra. The patient is to be placed in the same way as for perineal cystotomy. After having introduced the catheter, provided there should have been no obstacle to it, we again endeavor to ascertain by means of the finger the actual position of the stone. The operator then cuts down upon it and lays it bare. Should the first incision not appear to be sufficiently extensive, he enlarges its dimensions by reapplying at its angles the instrument first employed, but now guided upon a grooved sound. After this the means of extracting the calculi consist of the forceps, tenacula, fingers or scoop. On this subject we may consult the memoir of Louis inserted among those of the Academy.

### § III.—*In the Urethra.*

Calculi have been met with in every part of the excretory duct of the urine, in which duct, however small their size may be, they soon give rise to the occurrence of accidents. When behind the meatus, where Bernard (*Trans. Phil. Abr.*, vol. IV., p. 109) has met with them in two instances, or when they are in the fossa navicularis, where I have frequently seen them, it rarely happens that the efforts of the bladder and the volume of the urine will not be found sufficient to expel them. Upon the supposition however that it should be otherwise, we should proceed to search for them by the dressing forceps, the point of which is somewhat concave and flattened; or, as Sabatier recommends, by gliding underneath them a noose of iron or brass wire; or by means of a small scoop shaped like a hook, and which M. Civiale used on Boisseau in September, 1828; or finally, if these should be attended with too many difficulties, by incising the lower wall of the urethra in front of the stone, by means of a narrow

bistoury introduced into the interior of the canal and brought from behind forwards, unless we should prefer making use of a kind of concealed bistoury known under the name of *uretrotome*. An indispensable precaution, whatever may be the process we adopt, is that of fixing the penis firmly with the forefinger and thumb placed behind the calculus, in such manner as to be enabled to favor the expulsion of this last, or at least to prevent it from escaping backwards from before the instrument. The forceps, which has been employed with success, and the manipulations so much extolled by M. Polh of Moscow, (*Gaz. Méd.*, 1839, p. 168,) possess no peculiarity which has not been already essayed by others. The articulated scoop of M. Leroy, (*Rev. Méd.*, 1835, t. IV., p. 118,) either simple or with a sheath, together with the respective forceps of Hunter, Ravaton, or Weiss, and also aspiration, either by means of the mouth or in any other manner, as had already been mentioned by P. Alpin, would be suitable in these cases as well as in those which will be mentioned farther on. A dissecting forceps terminating in claws would succeed still better, should the calculus be small and be situated at less depth than two inches. I have used it with advantage in five instances. M. Wigan, (*Encyclogr. des Sc. Méd.*, 1839, p. 273,) with the view of dilating the urethra in front of the calculus, in the case of a child, employed with advantage a forced injection. When the stone is arrested in the commencement of the corpus spongiosum, the surgeon also commences by securing its posterior portion by means of one of his hands, and then endeavors to draw it towards him by means of the noose of Sabatier or Marini, in the way it was employed successfully by M. E. Rousseau. If this should not answer we have recourse to the sheathed forceps, the branches of which being dentated, slender, resistant and concave, do not separate until they arrive at the anterior side of the calculus, as if for the purpose of dilating the urethra and to cause the foreign body, when pressed upon by the finger, to lodge itself between them with facility. M. Civiale, in order to be certain that the forceps is properly placed, and not to expose to the risk of shutting it up uselessly, recommends that it should be explored by a stylet, the head of which separates the branches apart while it is being withdrawn towards the sheath. By means of this stylet the operator finds out where the calculus is and displaces it, even if it is not properly seized, and incurs no danger of wounding the patient. When it is once firmly grasped it is to be extracted, taking care to proceed with gentleness if it is somewhat large, and in such manner as to cause not the slightest laceration possible. When the calculus has established itself in a cul de sac on one side, it may convey the idea of a contraction of the urethra, and cause its extraction to be attended with serious difficulty. A patient who was sent to my care from Guadalupe, and who had suffered during the space of ten years, and undergone all kinds of treatment without any one ever having been enabled to penetrate into the bladder, and who urinated only in a very fine stream, was immediately cured as soon as I had extracted from the membranous portion of the urethra a calculus of the size of a small green pea. Should its volume have rendered its extraction difficult, which is a rare occurrence, inasmuch as its presence in the urethra could not have existed a sufficient length of time to have sensibly increased its

size, we should have recourse to broiement, or should traverse it by means of a perforator introduced in the place of the stylet, in order afterwards to break it down with greater facility.

A calculus mentioned by M. de Renzi, (*Gaz. Méd.*, 1834, p. 538,) and which was two inches long and a half an inch thick, and which surrounded the bulbous portion of the urethra, could not be extracted until an incision was made into the tissues, and after the stone had been broken up. Calculi also that become arrested in the *bulbous portion* should be treated upon the same principles. It is evident that we should experience more difficulties in the *membranous portion*, in which part, however, they are most frequently lodged. If the preceding attempts, which could be modified by making use, for example, of a curved forceps, should not succeed, and if the accidents were alarming, *an incision into the urethra* would be the only remedy. The same may be said in respect also to all the cases which have just been described, and for which extraction or broiement constitute only the first means to be made trial of. Who could otherwise than by an incision, extract a calculus developed in the urethra around a brass ring, as in the case of M. Liston, (*Arch. Gén. de Méd.*, t. I., p. 268;) or a calculus which should have acquired an inch and a half in diameter in the fossa navicularis, as in the patient of M. Schwartz, (*Bull. de Fer.*, t. XIV., p. 204)? When the necessity of an *incision* has become apparent, the following is the mode in which we should proceed. Should the stone occupy the second portion of the urethra, it is necessary that an assistant should keep it fixed at this point by means of two fingers introduced into the anus. The surgeon with a straight bistoury divides the integuments, which have been previously stretched, then the cellular tissue and all the parts contained in the base of the recto-urethral triangle, and finally in this manner comes down upon the foreign body. After having sufficiently enlarged the incision, he extracts the calculus by means of suitable instruments, and for fear that other calculi may exist in the bladder, or in the prostate, or in the remainder of the urethra, he explores all these regions with the grooved sound, or a female or any other catheter. Behind the scrotum the envelopes of the corpus spongiosum of the urethra are so movable that their division in general is attended with considerable difficulty. It is for this reason that it is advisable to introduce down to the stone and through the natural passage a strong grooved sound, then to raise up the scrotum as much as possible, to stretch the tissues carefully, to have the calculus secured by the fingers of an assistant behind it, and to give to the incision of the integuments a much greater extent than to that of the urethra itself. All this must be done in the first place, to reach the foreign body with greater certainty, and secondly, to prevent infiltrations. The same course should be adopted in respect to calculi in front of the scrotum, with this difference, that the scrotum should in that case be pushed back towards the anus. It is important in these different cases to open the urethra over the stone only in one point, and afterwards to enlarge this incision upon the grooved sound, either in front or behind. If we pursued an opposite course we should have a contused wound with fringed borders, but little favorable to cicatrization; while the process recommended

furnishes one which is regular, and the best possibly adapted if not for immediate reunion, at least for a union that is sufficiently prompt. As to the advice of Philagrius, (*Peyrilhe, Hist. de la Méd.*, p. 701,) who recommends, with the view of avoiding fistulas, that we should open into the urethra upon the dorsal surface of the penis, it could not be applicable at most but to small calculi arrested in front of the scrotum, and cannot, as I conceive, be revived again under any title. Moreover, is it very certain that Philagrius intended to speak of calculi and opening into the urethra, rather than of calculi and opening into the bladder? *Fistulas* are much less frequent after the urethral incisions, which I have just described, than would be imagined. M. Civiale relates the history of a patient who was operated upon at La Pitié by an interne of that hospital, and who had three large sized calculi in the urethra, viz. in the bulbous, membranous and prostatic portions. The operation was protracted and laborious, and left an irregular wound; nevertheless it was not followed by fistula. It is true, however, that this wound will sometimes remain fistulous, and that its cicatrization in certain cases is attended with great difficulty. In a patient operated upon in September, 1838, at the hospital of La Charité, and in whom, however, there was only a very small calculus in the bulbous portion of the urethra, the fistula notwithstanding still continued for the space of five months.

E. *Between the glans penis and the prepuce.*—Children are quite liable, as we have elsewhere said, to a contraction of the prepuce, which part in them is naturally very long. It results from this that the urine is effused there as it were into a sac, in coming out from the urethra, before making its escape externally, and that there will be formed here quite frequently calculous concretions, which have been noticed also in adults, though more rarely. They may acquire a volume which is really astonishing. Morand preserved a specimen of one which was almost as large as an egg, and which had on its upper surface a little gutter for the passage of the urine. Sabatier had in his possession a similar one which was still larger. The extremity of the penis in such persons becomes swollen and heavy, and usually pendant like the clapper of a bell. The extraction of such calculi is an easy matter. All that is required is to introduce between the prepuce and the foreign body a grooved sound, upon which we conduct a straight bistoury which incises and divides the tissues from within outwards. We might also incise them from without inwards by coming down perpendicularly upon the stone. It was an operation of this kind which made so much noise in Switzerland at the commencement of the last century, and which was given out by some persons as a case of supra-pubic lithotomy.

### [LITHOTOMY—LITHOTRITY.]

LITHOTOMY PRECEDED BY PARTIAL LITHOTRITY.—The first operation of lithotomy ever performed in *China*, was, according to our countryman, Dr. Parker, (see a memoir by him entitled *Notes of Surgical Practice amongst the Chinese*, in Cormack's *Monthly Journ.*, Edinb., June, 1846, p. 393, 394, &c.,) that which was performed by him about the year 1844, at Canton, upon Si-Yau, a resident of that city, aged

35. The stone was first crushed by a lithotritor about a year before, and was now extracted in two fragments by the lateral operation. They weighed together one ounce and a drachm, and measured  $5\frac{1}{2}$  inches in their united circumference one way, and  $3\frac{1}{2}$  the other. The patient was well on the 18th day. The success of the operation produced a great sensation among the Chinese.

Dr. Parker afterwards performed the operation of lithotomy in the course of the years 1844 and 1845, upon the following among other Chinese: His second case was Chau Wei, aged 21, 2 stones, one an ounce and the other one drachm. The rectum wounded, which induced the surgeon to divide the sphincter immediately. Notwithstanding this and the presence of large *worms in great numbers* in the stomach and alimentary canal, and the consequent irritability, the young man finally recovered perfectly, with only a small fistula in the urethra. Third case, Lui Kwan, aged 34, had had calculus for 23 years. Operated upon May 13, 1845; stone about 5 inches in circumference, and weighing  $2\frac{1}{2}$  ounces. The patient exhibited unparalleled fortitude, scarcely appearing to notice the incisions. The calculus was smooth, spheroidal, and of chocolate color. Though but a few ounces of blood were lost during the operation, a sudden movement of the patient on the 9th day, brought on considerable hemorrhage, yet the cure was complete by June 6th. Fourth, Hu Pin, aged 28. The stone, which was 4 inches by 3 in circumference, and weighed 5 drachms, was extracted by Dr. Parker, June 18, 1845, by the lateral operation. It was of the mulberry variety, with a surface as rough as sand-paper, showing brilliant minute crystals under a strong light. Like other Chinese, says Dr. Parker, this man acted most heroically, uttering no complaint, and smiling when the stone was shown to him. The next day additional fragments were removed. Though severe reaction ensued and continued for several days, the patient was discharged cured on August 3d.

*As hemorrhage in perineal lithotomy* constitutes the cause of *one-fourth* of the fatal terminations by this process, it is, as M. Bégin remarks, important to devise some efficacious means for arresting it. Deeming its source, from its slow exuding character, to be in a preternatural enlargement of the arterial capillaries in the perineum and vicinity of the bladder, he has suggested, where ligatures and torsion cannot be used, and has in two instances eminently succeeded by a process which consists (*Arch. Gén. de Méd.*, 3e sér., t. XIII., 1842, p. 372) in maintaining, by means of a gum-elastic syphon, a continued current of cold water in the wound.

*Supra-pubic lithotomy* was recently successfully performed by M. Ségalas (*Arch. Gén.*, Oct. 1844, p. 250) on a man who had been afflicted with stone from his childhood, but during an interval of 22 years experienced no inconvenience from it! It weighed 107 grammes.

*A new process for supra-pubic lithotomy.*—In the same way as we deem ourselves bound to give circulation in an elementary work of this description, to every new suggestion that may appear to be rational, we feel equally under a conscientious obligation to condemn in unequivocal terms whatever carries on the face of it positive error or harm, especially where it emanates from names justly possessing

a high authority. Such we consider the process of supra-pubic lithotomy, in two stages, again revived by M. Vidal de Cassis, (*Arch. Gén. de Méd.*, 4e sér., t. III., pp. 219, 220,) and this to be performed, not by the bistoury, but by the tedious, successive, painful and dangerous applications of Vienna paste and chloruret of zinc, gradually inflaming the tissues, in order that they may consolidate, and thus prevent urinous infiltration, after the bladder is opened into !

*Lithotrity.*—Dr. J. Randolph, in addition to several other cases of lithotrity, recently, it is stated, performed this operation (*Amer. Journ. of the Med. Sc.*, July, 1846, p. 263, &c.) on a man aged 30, with complete success ; having effectually crushed, pulverized and brought away the stone in four sittings, of a few minutes each, during the space of a month, and without any pain to the patient. He used Heurteloup's percuteur, and also a modification of this.

M. Leroy d'Etiolles has lately laid before the Paris Academy of Sciences, (sitting of April 27, 1846, *Gaz. Médicale de Paris*, 3e ser., t. I., May 2, 1846, p. 354,) a memoir describing a new set of *lithotritic pulverizing instruments*, (*pulverisateurs oscillants*,) and a new process which he has been in the practice of for the last two years, by means of which, where the stone is alone, and of large size, he is enabled, by making a lateral oscillatory movement, which presents the instruments successively upon all the points of the calculus, to crush it into *powder* in a few minutes. The instruments consist of rasps, blades, &c. When the stones are numerous and small, he continues to use the method of *écrasement*, which he has now employed *successfully*, it is stated, in over one hundred cases. This last method is made more effectual by associating with it artificial extraction. By means of a stone-breaker (*brise-pierre*), with large and deep scoops (*cuilliers*), he is enabled, every time he withdraws the instrument, to extract nearly two millimetres, cubic dimensions, of debris of calculus ; so that under favorable circumstances, a calculus of 35 millemetres of diameter, (15 lines,) may be broken up and removed at a single sitting. M. Heurteloup read at the same sitting a memor on the *immediate pulverization and extraction* of calculi, in which he states that he has succeeded in a great number of cases, in effecting *immediate* and *complete* extraction of fragments of the stone through the natural passages, frequently in much shorter time than would be required by lithotomy. His reasons in favor of this new modification, rather than leaving the expulsion of the fragments to nature, are : 1, because in simple breaking of the stone, there is a chance that the fragments may be lost in the bladder ; 2, because the broken fragments too frequently get lodged in the neck of the bladder or in the urethra, giving rise to serious accidents, and requiring subsequent operations much more painful and difficult than the principal one ; 3, the fragments, if left, may give rise to catarrhal inflammations of the bladder, which may endanger life ; 4, in quite a great number of patients, the simple breaking up of the stone would be injurious unless there was some mode of immediately extracting the fragments ; and 5, because the membranes of the urinary organs, when inflamed, are liable to make large deposits of phosphate of lime. Inflammation, therefore, should, as far as possible, be excluded from this operation. His *percuteur courbe à marteau*, so much extolled

by Sir Philip Crampton, (see *Dublin Quarterly Journal of Med. Science*, Feb., 1846,) as preferable to any other lithotritor, is the instrument upon which he chiefly relies. By this powerful instrument the stone is seized between two planes, one of which is rendered immovable by its connection with the fixed support, while the other is movable. By recent modifications he is enabled to measure with accuracy the size of the stone to be extracted, and to reduce it to the diameter of the two approximated scoops (cuilliers), that is, to the diameter of the urethra itself. Percussion is the great feature of his new method, and he effects the closure of the scoops by the hammer, in the same way that he breaks the stones with his percuteur. But the use of the hammer requires a point d'appui, in order to keep the instrument which holds the stone fixed and immovable, and which latter, from being movable, also becomes fixed and immovable. Now this point d'appui exacts an apparatus to support it, and in which it may be moved, and become instantly fixed or movable at pleasure. He effects this by means similar to those which he has long since made known, under the names of *point fixe* and *lit rectangle*, but in which he has made several important modifications.

M. Deleau, also, at the same sitting of the Academy, broached a new process for lithotripsy, which consists in introducing into the bladder a sort of artificial *pouch or bladder*, in which he causes the calculus to enter, and in which this latter is then broken up and pulverized by the ordinary instruments, or submitted to the *action of chemical agents*, without any danger of wounding the organs.

M. Taroni, of the department of the Aude, France, relates a recent case which is calculated to inspire farther dread in the application of a severe crushing force to lithotritic instruments. After succeeding in nearly crushing up a stone of 32 millemetres diameter with one of Charrière's No. 2 stone-breakers, (*Journ. des Conn. Méd.-Chir.*, Mars 1, 1846, pp. 101, 102, 103,) he found, after the fifth time of fracturing the pieces, and during which he made no false or stronger movement, that he could not, to his utter dismay, withdraw the instrument. He however succeeded in getting the broken branch lodged in the perineal portion of the urethra, from whence he succeeded in effecting its removal from the bladder. This is a serious warning in regard to the selection of instruments, when the processes most in vogue require, as we perceive, a great augmentation of crushing power.

*Lithotripsy in children.*—Though lithotripsy, for the various reasons given in the text by our author, cannot be conveniently applied to children, or at least was thought to be obnoxious to persons of this period of life at the time M. Velpeau wrote, some doubt may perhaps be expressed in regard to that judgment in the present more advanced state of this new mode of relieving calculous patients. M. Ségalas exhibited to the Royal Academy of Medicine, Jan. 4, 1841, (*Arch. Gén. de Méd.*, 3e sér., t. XIII., 1842, p. 243,) a child two years of age, from whom he had extracted, by *broiement*, a stone of considerable size, in twelve sittings. The stone gauged fourteen to fifteen lines of diameter. Other successes of the same kind induce M. Ségalas to consider extreme youth no exclusive objection to the process in question.

A new *lithotriteur* has been invented recently by Dr. Arthault of Paris, by which it is stated (*Lond. Med. Gaz.*, May, 1846, p. 843) that a stone of the size of a pigeon's egg was crushed up into an impalpable powder in the space of three minutes, the operation being performed on the *dead body* at the hospital, in the presence of several surgeons!

*Statistics of Lithotomy and Lithotritry.*—Dr. Wm. Keith (*Edin. Med. and Surg. Journ.*, vol. LXI., 1844, p. 123) furnishes one of the most impartial and lucid tables we have seen of the comparative merits of lithotomy and lithotritry. Out of 23 cases of lithotomy and 16 of lithotritry operated upon by him at the Royal Infirmary of Aberdeen, Scotland, between March 20, 1838, and March 20, 1843, there were among the former 1 death in  $11\frac{1}{2}$ , and of the latter 1 in 15. The average time of treatment of the first was  $60\frac{20}{23}$  days, and in the second  $44\frac{4}{5}$ . The average age in the first  $56\frac{1}{3}$ , in the second  $56\frac{5}{6}$ . The average weight of the stone in the first 8 dr. 14 gr., in the second 3 dr. 8 gr. Out of 19 of the cases of *lithotomy* aged from 50 to 78, only one died. In the ten years Dr. Keith has practised *lithotritry*, no accident of any kind has ever occurred to him. He dispenses with many of the instruments and with injections of the bladder. He has usually however selected the best subjects and small stones for lithotritry. Out of 42 cases of stone, the whole number received in the years mentioned, *only one* was a female!

One of the latest statistical tables on lithotritry, furnishes yet more favorable results for this operation than the general text of the author. M. Cazenave of Bordeaux, at the sitting of the Paris Royal Academy of Medicine, Nov. 11, 1845, (*Arch. Gén.*, 4e sér., t. IX., Dec., 1845, p. 496,) gives as the result of 52 operations by lithotritry, in his practice in the last 15 years, 43 cures and 8 deaths. One only continued to suffer after the operation, though two large calculi had been removed from him. Of the 8 deaths, this result in 3 was caused by circumstances foreign to the operation.

*New Process for Extracting the Stone from the Bladder.*—*Cystectasy* or *lithectasy*, so called, being a name given to a new process proposed by MM. Jno. Douglass, Dr. Wilson, Mr. Thos. Elliot, &c., (see *Edinb. Med. and Surg. Journ.*, January, 1843,) and which consists of crude, painful attempts, persisted in at the hazard of the patient's life for 24 hours, at dilatation, by introducing through a small wound in the perineum and membranous portion of the urethra a distensible pouch into the bladder, which is to be filled with liquid and left there, is one of those daring and irrational attempts to revive an obsolete practice which must be generally reprobated.

*Chemical action on urinary calculi.*—In the opinion of MM. Pelouze and Gay-Lussac, (see their report on the communications of M. Leroy d'Etoilles, *Arch. Gen. de Méd.*, 3e ser., t. XIII., pp. 502, 503,) acid and alkaline chemical re-agents act but very feebly on urinary concretions, and chiefly on their uniting animal matter. Besides which, this reaction itself may give rise to new concretions, in consequence of the saturation of the free acids, or acid salts of the urine. Neither in drinks, baths, or injections, can they be of great efficacy, and moreover in the last form are dangerous, though they would have, however, in association with lithotritry, the advantage,

from the calculus being broken into fragments, of allowing the injected chemical solutions to act on a far greater extent of surface.

*Gastric juice has been proposed as a simple solvent of calculi.*—We are not aware that the suggestion of M. Millot, to inject dilute gastric juice, (i. e., diluted with an equal volume of tepid water,) where lithotritic crushing instruments have failed, has ever been carried out in practice. M. Millot found (*Arch. Gén.*, t. III., 4e ser., p. 361) this solvent had a powerful disintegrating effect even upon the surface of mural calculi, which had resisted every kind of instrument. The idea of dissolving calculi by injecting *chemical* (not simple) solutions, had long since suggested itself to Fourcroy. Upon this principle it was, that Mr. S. E. Hopkins, (see *Transactions of the Royal Society of London*, 1843, Part I.; also *Arch. Gén. de Med. de Paris*, 4e ser., t. III., 1843, p. 103—105,) availing himself also of the well known fact of the affinity of lead for the phosphates, and of the common practice with country people of drinking hard cider in gravelly complaints, instituted a variety of experiments, the result of which was, that a mild combination, which he calls *nitro-saccharate of lead*, had a sensible effect in dissolving portions of calculous phosphates, and precipitating them under the form of phosphates of lead. Injected into the bladder of sheep, the solution of this compound produced no unpleasant effects.

*Urinary calculi.* according to M. Civiale in a late work, (*Traitemenit Médical and Préservatif de la Pierre et de la Gravelle*, Paris, 1840,) may alternate with each other. Thus *cystine* may be formed at one time, and the other principles of the urine at another. So uric acid and the oxalate of lime. This may occur without any known cause or change of food or medication. Hence, according to the experienced author, the doubtful efficacy of medicines directed against this or that calculous diathesis. Stone and gravel, moreover, may co-exist *simultaneously*. Here there must be a more profound lesion of the urinary function, so that after the breaking up and extraction of the stone, the gravel will, by aggregation, reproduce another stone, a certain lapse of time after the operation, thus often leading to serious misapprehensions. It is of the utmost importance, therefore, in cases of gravel, or its persistence, that the exploration should be extremely minute. Contrary to M. Ségalas and others, M. Civiale considers a particular attention to the instrument to be used a matter of importance, and for this purpose recommends, where gravel is in too large concretions to escape by the urethra, that we should make use of the *lithoclast*, as modified, in order to ascertain its actual morbid condition. In atrophy of the bladder we must recur to the *trilabe*. It is therefore a matter of great moment to resist if possible the formation of such gravelly deposites or sediments, by some *conservative* course of medical treatment, if any such exist. The *red sand* and *pulverulent deposites*, constitute, M. Civiale thinks, the first stage of gravel. This may be induced by a preternatural excitement of the kidneys, caused perhaps by some morbid condition of some portion of the apparatus; thus, contraction of the urethra, or a spasmotic closure, or neuralgic state of this canal or of the neck of the bladder. Hence, the utility he has found in cupping, leeches and emollients to the kidneys, general baths, copious use of

drinks that are slightly diuretic, certain mineral waters, and purgative medicines in divided doses. In the *gravel of uric acid*, the most common of all, M. Civiale classifies the disease under three varieties: 1, emission of gravel spontaneously and without pain; 2, nephritic colics with emissions of gravel; and 3, nephritic colics without expulsion of gravels. The disease in these, and also in the forms of cystine, oxalate of lime, and of white or phosphatic gravel, may go on in spite of the medical treatment, and then the difficulty may arise from some morbid state which paralyzes the efforts of nature and of art. Thus, the gravel may not be enabled to make its escape, because it is retained in the kidneys or ureters, or in the bladder. In the last mentioned, this retention may be caused: 1, by a spasmodic contraction of the urethra or neck of the bladder; 2, by one or more contractions in the deep-seated portion of the urethra; 3, by a tumefaction or other disease of the prostate; and 4, by a paralysis of the bladder. Age, sex, climate, and food, have also a great influence on calculous affections. An important point is, that M. Civiale pronounces decisively against the prevailing opinion in relation to the influence of *nitrogenized food* in the production of gravel and stone. He wholly rejects all attempts at cure by *chemical remedies*, either internal or external, and especially by *alkaline preparations*.

*Urinary calculi*.—The number of urinary calculi preserved in the museum of Guy's Hospital, and which, as given by Dr. Marct about 30 years since, amounted to 228, had in April, 1842, (see *Guy's Hospital Reports*, April, 1842,) increased, according to Dr. Bird, to 363. Of these: 245 have for their base uric acid; 17, urates of ammonia or of lime; 45, oxalate of lime; 11, cystic oxide; and 21, earthy phosphates.

Mr. Syme, in a woman aged 75, who had suffered from urination for 20 years, found on examination a stone which had occupied a distinct pouch between the urethra and vagina. There was an aperture into the pouch from the urethra, through which the morbid cavity was laid open along the whole extent of the urethra, and upon the stone, and without wounding or opening into the vagina. The calculus was oval, and an inch and a quarter long, and the woman rapidly recovered. (See Cormack's *Monthly Journ.*, Edinburgh, Feb., 1846, p. 83.) T.]

## PART EIGHTH.

## DISEASES OF THE URETHRA.

## CHAPTER I.

## CATHETERISM.

Catheterism is resorted to for the purpose of giving egress to the urine, for exploring the bladder, and for the cure of certain diseases, and to aid in the success of certain operations. The instruments which it requires, and which have been for a long time known under the name of catheters, which they still retain to a very considerable extent in England and in Germany, are more commonly designated in France by the title of *sondes* or *algalies*; this last word, however, is only applied to hollow tubes of metallic composition. Stems that are solid, cylindrical, conical or blunt-pointed, and of various substances, may also be employed for this purpose. The name of catheter is no longer applied [in France] but to the grooved instrument made use of in the operation of infra-pubic lithotomy. The object of the surgeon being that of penetrating into the urinary bladder through its natural outlet, a knowledge of the urethra is an indispensable preliminary, without which catheterism would expose to the risk of the most serious dangers. (See my *Anatomie Chirurgical*, 1827, t. II.)

## ARTICLE I.—EXAMINATION OF THE METHODS AND INSTRUMENTS.

Whether catheterism be *evacuative*, *explorative*, *conductive*, *directive*, or *derivative*, as M. Roux denominates it, it is in general performed in all cases according to the same rules.

## § I.

*Copper catheters*, (*sondes en cuivre*), which were formerly made use of, and which had the inconvenience of oxydating and becoming covered with verdigris, are universally replaced by silver catheters, (*algalies*.) The fragility of glass catheters as proposed by M. Zaviziano, would incur the risk of too much danger for any person to venture to make use of them. Flexible catheters made of horn, leather, or metallic spirals, having been contrived or used only for want of better, must also remain in the oblivion into which they have fallen since the invention of elastic catheters by Theden, Pickel and the watchmaker Bernard. Catheters of silver or those of *maille chort*, and those of gum or ivory that are flexible, are therefore the only ones which deserve to be retained; the first for those cases which require solidity and where the instrument is not to remain more than a few minutes in the organs; the second for those cases where, after the operation, it is desirable not to withdraw them im-

mediately from the bladder. The length of metallic sounds for an adult male is about twelve inches. If they were shorter they might, in certain old men, not reach as far as the bladder. If they were longer, they would expose moreover to the risk of wounding the organs and perforating the bladder. Their diameter should vary from two to three lines. They penetrate so much the better when every other proportion is attended to, as their volume is more considerable. For children we have them from a line to a line and a half in diameter, and five to eight inches long. If their wall has too little thickness, they may bend or become deformed, or break even upon the slightest effort. A contrary arrangement would take up too much of their canal, and would interfere with the flow of urine if the instrument did not possess a corresponding large calibre. Their free extremity, which is ordinarily flaring in the manner of a pavillon, is furnished with a ring on each side, in order that we may, if required, attach to it cords or threads. At a few lines from the other extremity, which is blunt, are found two lateral elliptical openings, in place of the simple apertures which were formerly made there. Those in which this extremity is replaced by the head of a stilette, which latter is pushed forward in order to open the catheter, and drawn back to shut it, are scarcely any longer used at the present day. The same remark applies to those which are open and free at their vesical extremity. The curvature which ought to be given to a catheter has given rise to a great deal of discussion. If they are straight it is an easy matter to push them forward like a cylinder by rotating them upon their axis, and to overcome with these instruments obstacles which the others could not surmount. But this advantage is more than counterbalanced by the pressure which their point makes upon the floor of the membranous and prostatic portions of the urethra, and by their tendency to escape into false routes. If they are curved they cause less pain, penetrate better, and are in every respect preferable. The S shaped catheter of the ancients and of Erisistratus, (MacIlwain, *Observ. de Chir.*, &c., p. 31,) and which was revived by J. L. Petit, and intended to give less fatigue to the canal when it was required to leave it there, has become of no value since science has possessed the flexible catheters. If the curvature should be very great and very much elongated, it serves no good purpose and interferes with the movements of the hand. The catheter which has the curvature only upon its end, as was advised by Rameau, and since recommended by M. Key and M. Stanley, (*Ibid.*, p. 27,) penetrates with more facility than a straight catheter, but scarcely makes any less traction upon the infra-pubic portion of the urethra. The most commodious are those which are curved only in their posterior fourth, in such manner as to form an arc, the cord of which has not more than three to four inches in length, and the radius not more than one to two inches. The axis of their beak brought back in such manner as to cross at a right angle the imaginary prolongation of their body, is the shape that I have found the best, in cases especially where the prostate is enlarged. The more it is turned backwards, the more difficult is it to enter into the bladder or to avoid our butting against the lower wall of the canal, to count from the perineal aponeurosis. The silver wire which they are provided

with is scarcely ever of any utility, and does not even possess the advantage of enabling us to clear out the apertures or to cleanse their interior when foreign substances accumulate there.

### § I.—Position of the Patient.

In most cases it is a matter almost of indifference whether the patient be standing up or seated, or lying upon the foot or edge of a bed or table, with his legs hanging down or supported, or whether he be merely placed in a horizontal position upon the bed. This last position, however, being the most convenient, is the one which is generally adopted. The semiflexure of the limbs, and the separation of the thighs, as recommended, give more ease to the operator, and may contribute to stretch and straighten the urethra, but are not, however, in all cases a matter of any great importance. The same remark applies to the position of the head, chest and belly, all the muscles of which, it is said, ought to be carefully relaxed.

### § II.—Position of the Surgeon.

Unless the surgeon is ambidexter, he places himself on the left, and cannot remain in front of or between the legs of the patient, unless this latter desires or has need of being catheterized out of the bed. With the left hand turned in semi-supination, he seizes the penis by its sides between his ring and middle finger, then uncovers the glans, or at least the meatus, by drawing the prepuce back with the thumb and forefinger. With his right hand holding the catheter in the manner of a writing pen, and with its concavity turned towards the abdomen, he presents its extremity to the urethra and in a perpendicular direction, and passes it in, in this manner, and without raising the pavillon, down to the bulb. By a vibratory movement made from right to left or from the belly towards the space between the thighs, a species of circular movement in which the two *extremities* of the sound *appear to run after each other*, he then lodges it in the membranous portion under the pubes, and makes it pass through the prostate and the entire curved portion of the urethra in such manner that it may embrace, so to speak, the posterior side of the symphysis, and that its flaring portion may be found in the axis of the lower strait. The urine immediately presents itself, and the thumb allows it to flow or stops it, according as may be required, by opening or shutting the orifice of the artificial tube.

### § III.—Difficulties of the Operation.

Catheterism is sometimes attended with a great deal of difficulty. It is an operation which requires practice, accurate anatomical knowledge, and a certain number of precautions. If the beak of the sound fell too much upon the lower wall of the urethra, it would not glide without difficulty, and might be arrested at the fossa navicularis, then in the bulbous cavity, afterwards by the prostatic depression, and deviate into the bottom of either one or the other of these dilatations. In forcing it to follow uninterruptedly the upper wall, such accidents

will not have to be apprehended, unless we raise it up too much and in place of keeping its axis in relation with that of the canal, it should fall upon a more or less open angle upon the plane which it is to pass over; moreover, this bad direction, unless it should be excessive, would not be attended with any actual inconvenience except on arriving between the roots of the corpora cavernosa at the anterior surface of the symphysis. The important point, therefore, is to make the catheter follow in the axis of the urethra from the meatus up to the bladder, by pressing it with some slight force upon its dorsal portion. In this respect there can be no fixed rule, because there are no constant relations between this axis and that of the body. In certain patients it is necessary that the pavillon of the catheter should, so to speak, remain parallel with the walls of the belly, while we are passing through the spongy portions of the organ; while in other patients we are obliged to place it at the beginning, in the plane of the lower strait. Force moreover is never required. The instrument should go forward as much under the influence of its own weight as from the action of an external power. If it meets with resistance, we withdraw it a little, in order to incline or direct it in another route. In pulling over it the urethra from below upwards and from behind forwards, as a number of authors recommend, in conformity to Le Dran, we create obstacles instead of destroying them. This precaution cannot be of any utility except in the penic portion of the canal. Farther on it flattens it, and has a tendency to efface it against the border of the infra-pubic ligament, and must necessarily favor its laceration. The mode of entering the bladder with certainty, consists in allowing the catheter to descend freely to the origin of the membranous portion, that is to say, to a line with the lower border of the symphysis, in such manner that it may not depress either the upper or lower wall of the urethra against the perineal side of the horizontal aponeurosis, then to make it vibrate suddenly though without effort, by depressing its pavillon from before backwards, to such degree that it may become parallel with the axis of the thighs. This movement conducts it forcibly into the urinary bladder, provided its extremity is no longer on this side the pubes. In the opposite case it butts against the front part of the articulation. The penis stands at an angle and the instrument springs back in place of advancing. The difficulty most usually arises from the operator being fearful of depressing the outer portion too much, and from scarcely reflecting how much it is necessary to raise up its point, in order that we may not be interrupted by the posterior border of the prostate. However little resistance we may meet with in approaching the symphysis, the left hand should proceed to discover the cause of it, by raising up the scrotum and exploring the perineum, and by endeavoring to identify the beak of the catheter through the canal by means of the fore and middle finger, and by following all its movements. Should the instrument have advanced a little farther than this, the forefinger should be introduced into the anus and intestine. Serving as a guide and explorative means as above, it indicates precisely in what direction the efforts of the other hand are tending, or whether we are yet in the membranous or in the prostatic portion. We discover by the thickness of the intervening

tissues, if there is reason to presume that we have made a false route, and the finger may if necessary assist in making the catheter take a direction towards the bladder. We must, nevertheless, not deceive ourselves upon the value of this manœuvre, which is in no respect applicable to rectilinear catheterism. By raising up the prostate the finger increases the curvature of the urethra, has a tendency to apply it with greater force against the infra-pubic ligament, and naturally presents its soft or lower wall against the beak of the catheter. To derive all the advantage from it possible, it is important, as soon as we have ascertained the state of the parts and are desirous of exercising the slightest degree of force, that we should withdraw the pulp of the finger a little to the front, in order to fix it upon the convexity of the instrument at a little distance from its extremity. In this manner the portion of the canal which remains to be traversed does not sustain any pressure which can augment its curvature, while the combined action of the two hands is no longer attended with the slightest danger.

#### § IV.

*The signs which announce the entrance of the instrument into the bladder,* are so evident in most patients, that they speak for themselves, and do not require to be described. But in certain cases many of them may be wanting, and the diagnosis is then so obscure as to give embarrassment to the surgeon. If thick mucosities, sanguineous concretions, &c., become lodged in the apertures of the catheter, the urine does not flow. M. Berre, (*Arch. Gén. de Méd.*, t. XVII., p. 105,) after having spoken of a patient affected with retention or suppression of urine, during the space of six months, and who should not have been surprised at the case of M. Mathieu, (*Ibid.*, t. XVII., p. 279,) relates, that in applying the catheter to another, he saw nothing escape by the instrument, and that this was owing to the bladder being filled with blood. Catheters which have a strong curvature, remain sometimes so closely applied against the anterior wall of the bladder that they continue immovable, and shut up as high up as above the upper strait. When the urinary bladder is empty, retracted and very narrow, we penetrate to so little depth, and the movements of the catheter of depression, elevation and rotation, and to the right and left are so limited, that we are induced to doubt in respect to the place that the instrument occupies. A considerable mass of blood accumulated in the anterior half of the bladder, an instance of which M. Mathieu affirms that he has seen, would be well calculated to lead to deception, since we would be obliged to pass through the whole thickness of this before reaching the urine. On the other hand, it has been noticed that the catheter, after having become entangled to a great depth in the tissue of the recto-vesical septum, has been susceptible of movements almost as extensive as if it had been free in the bladder. We are still more liable to this error, when in consequence of a large ulceration in the floor of the urethra, a cavity or accidental pouch of considerable size has been made in the tissues of the perineum in front of the rectum, a remarkable example of which I saw in an adult man, who died in

1825, at the Hospital of the School of Medicine, and as occurred in several other instances which I have since seen, and instances of which have been also noticed, M. Roux informs me, by him. This pouch in fact may be taken for a diseased bladder, and so much the more so, because the catheter, in penetrating into it, immediately gives egress to a certain quantity of urine.

### § V.—*The raising up of the Bladder.*

Without speaking of hydatid (Bright, *Gaz. Méd.*, 1838, p. 490,) or other *cysts*, of collections of all kinds, tumors and polypi which, occupying the recto-vesical cul de sac in man, the recto-vaginal cul de sac and the vagina or uterus in woman, sometimes push forward the bladder in such manner as to interfere with the catheterism, and to lead to deception in respect to the point which the instrument is passing; I will make a remark here of another arrangement, which is still too little understood. It is believed, and it is generally true, that the bladder, when distended by urine, becomes dilated backwards and downwards in such manner that it soon fills up the pelvis, and makes a strong prominence in the rectum. In such cases there can be no difficulty thereby produced for the employment of catheterism. But I have frequently observed an opposite arrangement, that is to say, that the finger, which upon entering into the intestine, falls into a sort of empty cavity, finds there neither tumor nor prominences, and that the bladder has mounted up entire into the hypogastrium. The same thing must take place under such circumstances as happens to the uterus during pregnancy. The bladder assuming, in consequence of its repletion, the shape of a bottle with its neck downwards, and confined by the upper strait of the pelvis, gradually elevates itself, by becoming distended above this cavity. In order to reach the bladder, it is indispensable in such cases to make use of a catheter having its beak strongly curved, and possessing itself a deep, regular curvature, and in the form of the arc of a circle; and to draw, by means of the finger fixed in the anus, the sphincter towards us, while with the other hand the catheter is pushed forward with all suitable precaution. The sensation that we have overcome a resisting point beyond the pubes, the free action which we suddenly find given to the inner extremity of the catheter, and the facility with which we may impart to it any kind of movement without causing any decided pain, together with the route and direction which it must have passed over, and finally, the escape of urine, prove that we have entered into the bladder; but there are cases in which many of these signs may be wanting, and others in which they may be counterfeited to a greater or less extent.

### § VI.

After having tried in various ways, it is advisable, if the instrument does not penetrate, to select another whose curvature is different, and either greater or less, according to the indication which we may believe to be presented, and also to find one of larger calibre, which,

by straightening out and opening the canal in a more uniform manner, frequently passes, when the smallest kind would be arrested. At other times we succeed better with a catheter which is of decidedly less diameter; after which we proceed to make trial of the gum-elastic tubes. We change and vary the position of the patient, and when it is no longer possible to attribute to the instrument or the operator the difficulties which present themselves, we proceed to the examination of those which may exist in the canal itself. The tortuosities, congenital or acquired, the deviations in consequence of diseases, the congestions and humoral engorgement of the mucous membrane or tissues which surround it, the varicose condition of the prostatic plexus, and extreme development of the *verumontanum* or of the vesical *luette*, a fibrous or other tumor on the posterior border or in the lobes of the *prostate* or on the trigonus, and finally, the spasmodic contractions of the perineum or of the urethra, are in this respect the principal obstacles that we encounter. We avoid or overcome some by well directed movements. The others require to be met by various means. A powerful bleeding by the arm, leeches between the scrotum and anus, general baths, continued for a long time if the patient is strong and suffers much, anodyne potions, and pomades of belladonna and hyoscyamus applied over the track of the urethra and in the anus, when the irritability is very great and the spasmodic movements decided, constitute the series of remedies to be made use of in such cases. An adroit and skillful surgeon will scarcely ever fail to succeed by using each of these judiciously, and at the proper time, and in succession. If *spasm* of the urethra, properly so called, actually exists, and we may wait for a few hours without any danger, we must meet it, as I have said, by taking the precaution to divert the mind of the patient as powerfully as possible, as is recommended by M. MacIlwain, (*Observat. de Chir.*, &c., p. 31;) but in urgent cases we should do every thing in our power to overcome it, and it is a matter of doubt in my mind, if with a person of a practised hand it could in reality constitute an insurmountable obstacle. It would be a subterfuge far too convenient also for unskillful persons, if we were to admit, as they do, that spasmodic contractions exist merely because it is impossible for them to reach into the bladder. As a contraction of this kind must necessarily be of short duration, and does not completely obliterate the urethra, it must be that art can triumph over it by exercising a little patience, and by making use of small, or even large instruments.

#### § VII.—Flexible Catheters.

With flexible catheters we traverse the urethra in the same manner as with the preceding. It is nevertheless true, that as a general rule they penetrate with less facility than silver catheters. If we have to introduce them into a tortuous canal, we remove the stilette from them, in order that they may inflect upon all the deviations that are to be overcome. On the contrary, we insert into them a metallic stem, which should be as strong and as regular as possible. This stem, which is curved like the ordinary catheters, becomes their conductor, and ought to occupy them as far as to their inner extremity,

and to go beyond their outer extremity, where it is usually terminated in a ring. It is important to guard with care that it does not escape through the apertures of the catheter, for it would expose to the risk of wounding the urethra. Though it may be easy when it passes under the pubes to increase its curvature by means of the finger slipped into the rectum, it is more prudent however to give it before commencing the operation the direction that may be required. All that is required to withdraw it is to bring it back towards the abdomen with the right hand, while the left hand secures the catheter below and pushes it toward the bladder. If this manœuvre is sometimes more painful than the operation itself, it is from its having been badly executed. It does not take place if we make the stilette on coming out describe the same arc of a circle that it did on entering. Some persons after the manner of Hey, have succeeded very well after they have reached the pubis, in acting no longer on the stilette, but in holding it fixed with one hand while with the other we push exclusively on the catheter, the blunt and flexible beak of which passes with more facility through the remainder of the urethra when it is thus by itself alone, than if it was conducted by the stilette. Others improving upon an idea of Physick, make use of such flexible catheters as have their beak tapered out in the shape of a long conical point, which is pliant and solid, and extends beyond the stilette. Hey, with the view of irritating the bladder less, proposed to give a permanent curvature to these catheters, which modification various French surgeons have adopted, and which in my opinion has no other inconvenience than that of being too great. As catheters of gum-elastic or flexible ivory are employed only in those cases where it is desirable to leave them remaining in the bladder, they are entitled in this respect to all the attention of the practitioner. In the first place, their composition ought to be such that no inflection can break or chafe them, or destroy the polish or smoothness of their surface. Unless this were the case, they would soon become rugose in the urethra, and too speedily acquire an incrustation from the urinary salts; while any body may understand what may be the consequence if a fragment of one of them should fall into the bladder, as has but too frequently happened. The best test that we can put them to, is that of bending them or twisting them suddenly on their axis. If they resist and do not change in their aspect, we may employ them with confidence; in the contrary case, they are to be rejected. The projection of red wax, which is found on their outer extremity, is for no other purpose than to form a groove there for the cords which we use in attaching them; it would prevent them also from passing completely into the urethra, and of escaping towards the bladder should the hand let go its hold upon them. We cannot at first understand how it could be possible for a catheter of 10 or 12 inches long, left to itself, to escape entire into the urinary bladder; but there exist indisputable evidences of this fact, and M. Roux was compelled to perform cystotomy for an accident of this description.

## § VIII.

*The catheter is fixed in the bladder in an infinite number of ways, all of which have been described in the first volume of this work. An important precaution is not to have it inserted too deep. Though flexible, it may inflame, ulcerate, and perforate the bladder, instances of which are known, and a certain number of examples of which have been stated by MM. H. Bérard, Corby, and Marjolin. If, on the other hand, its apertures should not go beyond the prostate, the urine could not pass into them, and the instrument would be of no use. Finally, it is advisable not to leave more than an inch or two of it in extent in the interior of the organ, and when the penis is relaxed, to attach it near the glans. instead of placing the containing means on its pavillon or at its extremity. Unless we desire to allow the urine to run out drop by drop, we shut up the catheter thus adjusted by means of a small peg of wood or a kind of fasset, which the patient removes when he feels a desire to urinate, and replaces immediately afterwards. As it does not absolutely prevent the patient from walking, we may make it more supportable and guard it better, by taking the precaution to keep it gently turned back with the penis by means of a turn of bandage over the mons veneris. Prudence also requires that it should be withdrawn every two, three, or four days, in order to clean it, and that it should be changed as often as it exhibits the slightest alteration; which happens every 8, 10, 12, or 15 days. In keeping it in for a longer time, we incur the risk of having it become encrusted with saline or calculous matters, and finally of its lacerating the urethra when we wish to withdraw it.*

§ IX.—*The Master Turn, (tour de maître.)*

In former times lithotomists and the great surgeons had a peculiar manner of performing catheterism. In order to introduce the catheter, they turned its concavity downwards, and only brought it back again towards the abdomen by a half turn of a circle at the instant when its beak arrived under the pubic ligament. The rest of the operation did not differ from the one above described, and the improvement consisted in making the circular pass imperceptibly into the vibratory movement, which alone could justify the expression *tour de maître*. It was for a long time thought that this method had no other object in view than that of concealing from the eyes of the assistants the true nature of catheterism; but it would appear to comprehend something more. The extremity of the catheter conducted in this manner executes in the curved portion of the canal a movement of rotation which unquestionably facilitates its passage under the symphysis, and we combine by this means the advantages of straight catheters with those which are possessed by the curved instruments. As however it is a delicate manipulation, which would not be unattended with danger in the hands of every one, it has generally been proscribed or reserved for some special cases. It is rendered necessary, for example, where there is an extreme projection of the belly, or when in lithotomy we place ourselves in front of the patient in order to introduce the catheter. Even there, however, it

is not indispensable, for nothing prevents our turning the pavillon of the catheter to one side during the time of the operation, if the size of the belly or the forced position of the surgeon do not allow him to direct the instrument as in ordinary cases.

### § X.—*Catheterism in Women.*

Female catheters have but five or six inches in length and scarcely any curvature. Their introduction in general is a matter of extreme facility. The canal that they have to pass through is so short and regular, and so easy to find and to follow, that it scarcely resembles in anything that which exists in man. The patient when laid on her back is more conveniently situated than when she is standing up or seated on the edge of her bed. The surgeon, on his part, being placed to the right rather than to the left, causes her thighs to be widened apart and her legs to be gently flexed; placing his left hand in pronation upon the mons veneris, he opens the labia minora, by means of his thumb and middle finger; raises up the clitoris and vestibulum with the forefinger, the nail of which is to remain turned towards the meatus urinarius; takes the catheter, which has been previously oiled, and holds it in the manner of a pen in his right hand; passes it underneath the corresponding ham, if the breech and vulva appear to be too deep; presents its beak with the concavity upwards to the orifice of the urethra and depresses it a little in order to pass it underneath the symphysis; then immediately raises it up, and with one movement enters into the bladder.

A. Having pointed out the mode of keeping the instrument in its place, under the article of *Vesico-vaginal Fistula*, and in Vol. I., of this work, I will not here return to this subject. This operation is so alarming to the modesty of certain females, that it would be a fortunate thing if we could perform it without exposing their persons to view. This thing is generally practicable and even easy of execution. If after the left hand has been placed as above described, the beak of the catheter is placed upon the nail of the forefinger, all that will afterwards be necessary will be to make it glide gently upon the vestibulum by following the median line from above downwards, by which means it falls almost inevitably into the meatus. We should succeed with more certainty still, by directing the catheter from below upwards, supporting its extremity upon the pulp of the right middle finger, while the ring finger of the same hand serves in some respects as a sentinel or exploring instrument. In fact this finger recognizes the fourchette, then the entrance, and afterwards the anterior column of the vagina, the termination of which latter, and which is more or less dilated in the form of a tubercle, is found immediately below the urethral orifice. Having arrived at this point, the ring finger stops. The other fingers cause the sound to glide upon its pulp and make use of it as a conductor. The meatus cannot be at a greater distance than a line or two. We feel around a little, and almost always enter into the canal without any difficulty.

B. *In women who have had many children, in old age*, during pregnancy and after delivery, the finding of the urethra is sometimes attended with considerable difficulty. Having receded into the pel-

vis behind the pubes, it becomes very oblique, or is even raised up completely against the symphysis. In such cases we seek for its meatus quite deep under the pubic ligament, and if it does not show itself at first, we endeavor to bring it into view by drawing, by means of the forefinger, upon the vestibulum and base of the clitoris above, at the same time that the middle finger and thumb draw the nymphæ with considerable force to the outside. The catheter having been introduced, it becomes necessary to depress its pavillon quickly. We are even sometimes obliged to make use of one of greater curvature, or to have recourse to a male catheter. In conclusion, even when the parts are deformed, as during the first days succeeding delivery, for example, if the surgeon calls to mind that the meatus urinarius is always situated at the anterior border of the vagina, at the point of union of the circumference of the vulvar opening of this canal with the base of the vestibulum, that is to say, of the little triangular cavity which forms the limit to the inner side of the nymphæ and lower side of the clitoris, he will find that catheterism is in no respect an operation attended with any serious difficulty in persons of the female sex. The thesis of M. Larcher, (No. 339, Paris, 1834,) and what I have elsewhere said on this subject, (*Art des Accouch.*, 2d edit., Paris, 1835, t. II.,) will serve as a supplement to this article.

### § XI.

In the *early period of life*, catheterism is only difficult in consequence of the intractability of the patients. The catheters ought to be of less size, that is from one to two lines in diameter, and of less length, that is, from five to seven or eight inches long, but prepared and conducted and fastened in the same manner as in adult age; except that it is well to have the curvature a little more elongated, because of the symphysis which descends lower down, the bladder which is more raised up, and the prostate which is of less size in young boys than in men.

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## CHAPTER II.

### CONTRACTION OF THE URETHRA.

Catheterism, forced injections, dilatation, cauterization, excentric incision or scarifications, together with incision from without inwards, have all been recommended and employed as remedies in organic coarctations of the urethra.

#### ARTICLE I.—FORCED CATHETERISM.

By forced catheterism is meant at the present day two kinds of operations, which are quite different from each other. In one we make use of a blunt-pointed instrument, but one that is conical and

sufficiently sharp to penetrate with considerable force into the bladder in passing along the track of the urethra; in the other we employ a cylindrical large sized instrument, with the sole view of dilating the natural contracted canal. One is used for retention of urine and the other for contractions of the urethra.

### § I.—*Forced, Ordinary or Evacuative Catheterism.*

When there is a complete state of ischuria, and when the obstacle which causes it cannot be overcome by any manœuvre, either by means of the metallic or gum-elastic sound, the straight or the curved, the hollow or the solid, nor by means of the various kinds of bougies, and that the symptoms are urgent, the surgeon has no other choice left than puncture of the bladder or forced catheterism. This operation had already been recommended at the time of Deaz. To perform it they had recourse to a sound which terminated in a trochar point. At present, those who venture upon this operation make use of a strong conical sound, which is properly curved. The idea of this operation is ascribed to Desault and Boyer; but Coffinière, who warmly contested their pretensions, avers that it belongs to him and that he had made it known in 1783. In France, M. Roux is almost the only person who, since the time of Boyer, has undertaken to advocate it; with the exception of Physick, who, according to Dorsey, had followed this practice since the year 1795, it has had nothing abroad but opponents. It has been supposed that by endeavoring to remove obstacles in this manner, the sound would lacerate the canal and make a false route much oftener than it would perforate through the coarctation, and with those who know the dangers of urinous infiltrations, the idea of such lacerations seemed exceedingly alarming. In this respect I consider that the greater number of practitioners have not been in error. Notwithstanding his dexterity and skill, M. Roux has in more than one instance had an opportunity of verifying the dangers of his method. I have myself had an occasion of opening the dead body and of dissecting the urethra of a man whom he had treated in this manner, and who died of urinous abscesses caused by a false route. Nevertheless, it appears certain that the dangers of this process have been exaggerated. The instrument if properly conducted, does not always, in passing through the resisting point, deviate from the natural track. Again, when it actually forces itself through it in place of reopening it, the instrument, if it actually escapes from the urethra, does so in most instances only to re-enter it again at a few lines beyond. Finally, upon the supposition that it does not reach the bladder until after having been working its way for a long time through the body of the prostate, the accident is still far from being always fatal. A sound left remaining in, may transform the false route into a new passage, without the system being scarcely affected by it, an instance of which I saw in 1830 in one of the hospitals of Paris. Nor is it a rare circumstance to find the urine resume its course, after the lapse of a few hours or some days, through its natural canal, and I cannot say, in fact, if forced catheterism with a conical sound ought not to have the preference over puncture of the bladder, with all such surgeons

as are sufficiently sure of their hand and in their anatomical knowledge, not to have any apprehension of making a false passage while traversing the perineum.

A. *Operative process.*—The patient and surgeon are placed in the same way as for ordinary catheterism. The heavier and more solid the sound is, the better it will penetrate. The ordinary sound exposes to the risk of laceration more than any other, and would not re-enter into the urethra with sufficient facility, unless the form of cone which it has, tapered gradually back as far as the pavillon. If this cone was limited only to the vesical extremity, it could not progress with sufficient facility. If it once got out of the canal, it would advance too rapidly in the midst of the tissues. In general, force is not required until we leave the bulb and line of the symphysis. The right hand is then to approach the glans penis, and the instrument to be seized rather by its body than at its extremity, in order that it may vacillate less, and that it may be held with more facility, and with all the firmness desirable; it is then pushed forward exactly in the known direction of the urethra, without allowing it to make the slightest deviation, or to progress except in proportion as the fingers or one of the fingers of the left hand, applied over the perineum or into the anus, shall watch over its movements, and can appreciate its progress, and convey to us the assurance that its beak has but slightly deviated from the centre of the membranous and prostatic portions of the passage which is to be traversed.

B. *False routes.*—The short sound, in lacerating the urethra in its bulbous portion, runs the risk of tearing also the whole extent of the perineum and recto-vesical septum, or may go even so far as to perforate into the intestine before it again finds the urinary canal, or it may not enter into the bladder at all. The false route is then so much the more dangerous, inasmuch as it does not even afford egress to the urine. Should the laceration have taken place above, and the point of the sound have got between the posterior surface of the symphysis and the front part of the bladder, the mischief would be still greater, for the infiltration which would take place in the pelvic cellular tissue, would almost unavoidably result in death. False routes through the prostate are infinitely less dangerous: 1st, because the tissue of this gland makes greater resistance to the contact of urine and generally prevents its infiltration; 2nd, because the instrument, though it has slightly deviated from the channel which is to be liberated, almost always re-enters into it before having caused any particular injury, and before having passed to any great extent outside of it. When it has been ascertained that we have made a false route, we must, should it not be complete, withdraw the sound towards us, and do every thing in our power to find the urethra again, and to re-enter into the natural passage; or if this route has made a communication with the bladder, we must leave the instrument in, until it is in our power to replace it by a gum-elastic catheter, which should be left to remain there for the space of several days. When infiltration has taken place, and the accidents, and tumefaction, and inflammation have commenced, whether the bladder be empty or not, or whether it be possible or not to place a ca-

theter in the urethra, we must no longer hesitate, but make a free incision upon the presumed track of the laceration, and endeavor to cut down upon the urethra. It is the only way to limit the extension of the mischief, and to prevent the mortification of the tissues.

### § II.—*Forced and dilating Catheterism.*

A new mode of treating contractions of the urethra by catheterism has been introduced into practice since the year 1830. M. Mayor of Lausanne, author of this method, (*Cathet. Simple et Forcé, &c.,* 1835,) laying it down as a principle that the sound in order to be enabled to penetrate, ought to be so much the more voluminous as the contraction is more considerable, created at first much astonishment among practitioners; but having invoked to the support of his axiom some arguments that were specious, together with a certain number of facts, it soon found partisans even in the hospitals. Having, on my part, noticed that frequent trials of this process were being made at Paris, I deemed it proper to examine the question under its different aspects. I soon perceived, as was established also by M. A. Vidal, (*Journ. Hebdom.*, 1835, t. IV., p. 353.) and as was maintained by M. Gaillardet, (*Thèse*, No. 342, Paris, 1836,) a short time afterwards, that this new method taken in its literal acceptation was a dangerous one, that the successful results obtained from it were more apparent than real, and that they were ascribable to a confusion of terms. With M. Mayor's sound in fact, we cannot succeed but in two kinds of cases. 1st. When there is no contraction, and when we use the process I pointed out in 1832. 2nd. When the obstacle is purely valvular, because an incomplete diaphragm, as it may be more easily straightened and spread out in a passage regularly distended, ought to be ruptured with more facility and with more accuracy by a large and heavy sound than by a slender and slight instrument. Otherwise, and in real coarctations, the Mayor sounds cannot penetrate but by tearing up and lacerating the tissues, and by exposing the patient to serious dangers.

Had not the proof of what I here advance been given by MM. Vidal and Gaillardet, I could produce it in the cases themselves, presented by M. Mayor and his disciples. What do we see, in fact, in what has been published on this subject? The instruments of M. Mayor are of pewter, and either hollow or solid, curved according to the direction I have given for them, and divided into six varieties or numbers, counting from two lines to four and a half lines. In the first of the cases related by this surgeon they began without difficulty with No. 1; which, according as it seems to me, does not authorize us to assert that the urethra was actually contracted. The second patient was an Englishman, whom a cauterizer could not sound, but who by means of a large catheter succeeded in sounding himself. In the third patient they employed in succession three numbers of the elastic sounds, and afterwards the numbers of the pewter sounds. The fourth had undergone puncture of the bladder for ischuria; M. Mayor sounds him; the patient dies, and it is ascertained that his urethra was perfectly free! No. 1 entered with

facility in the fifth, though there was retention of urine. The seventh and eighth were easily sounded from the first by Nos. 2 and 3. Finally, the author completely failed in the sixth patient, who was affected with an actual organic coarctation, (see Mayor, *Oper. cit.*, pp. 36, 37, 39, 40, 41, 42, 49, 50.) For myself, I am convinced that in these different cases the affection was an ischuria from deviation of the urethra or disease of the prostate, and not from any coarctation of the canal whatever. I would say the same of the patients of M. Chaumet, who employs large silver sounds in place of those of pewter. In the first case he succeeded with a sound of three lines, though another surgeon who had employed a fine sound had failed; but he confesses that the obstacle was at the prostate. The same thing existed in the second case, and the man was 67 years of age, (*Gaz. Méd.*, 1834, p. 814.) In the third case he was stopped at the distance of six and a half inches, and consequently it was at the prostatic region; and his fourth patient from being attacked with ischuria at 84 years of age, (*Ibid.*, 1835, p. 769,) certainly owed this affection also to the condition of his prostate. As to the practice of M. Devergie, (*Ibid.*, 1835, p. 782,) who moreover adduces in support of it the essays of MM. Desruelles, Henri, Barthélemy, &c., and who actually had to do with contractions of the urethra, it has not in fact any positive relation with forced catheterism. In every instance in fact, in which the contraction was at the distance of two, four or five inches, they began with cauterization or bougies, or Nos. 1, 3, 4 and 5 of the ordinary sounds, before proceeding to the use of the Mayor instruments. Now who does not perceive that in proceeding in this manner they followed the principles laid down by me in this work a long time since, and not those of the surgeon of Lausanne? Need I add that the seven patients mentioned by M. Boinet (*Gaz. Méd.*, 1835, p. 721) were all, like those of M. Vidal, attacked with grave accidents, in consequence of the forced catheterism? This mode of practice therefore at the present day is definitively adjudged. The essays which I have just spoken of only prove, as I had said in 1832: 1st, that for retentions of urine caused by a tumor or disease of the prostate, or by a flattening or deviation of the urethra, sounds that are large and heavy, and regularly curved into an arc of a circle in their vesical half, are better than the ordinary sounds or bougies; 2d, that it is practicable and often advantageous to proceed in a few days from the first to the last numbers of the common bougies or sounds, while treating contractions of the urethra; and 3d, that the instruments of M. Mayor, with these exceptions, and examined under this point of view, will notwithstanding render essential service to the patient.

## ARTICLE II.—FORCED INJECTIONS.

A means to be made trial of when there is retention of urine, before proceeding to paracentesis of the bladder, and one which is not attended with the same dangers as forced evacuating catheterism, is that of distending the urethra by means of a liquid thrown up from before backwards. Trye, who was the first to make this suggestion, namely, in the year 1784, states that he derived the greatest

benefit from it, and Sœmmering mentions that where the finest bougies cannot be made to overcome the contraction, he injects oil into the canal, then immediately shuts up its orifice, and afterwards makes pressure from before backwards, in order to push along the liquid. The method of Brunninghausen is somewhat different. At the moment when the patient has a desire to urinate, he forcibly makes pressure upon the urethra behind the glans penis, compels the fluid to retrograde, and in this manner expects to destroy the contraction. In 1822. M. Despiney of Bourg proposed a liquid which was purely emollient, and which was to be pushed up with a syringe. M. Citadini, (*Rev. Méd.*, 1826, t. II., p. 493,) who has published a memoir on this subject, introduces a catheter down to the point of resistance, holds the urethra firmly applied upon it, and makes use of it as a syphon to inject into the canal tepid water or any other suitable liquid with all the force that may be required. M. Amussat, who considered himself the inventor of forced injections, proceeds nearly in the same manner as M. Citadini. He recommends that we should apply a compress around the penis, in order that no void may be left between the catheter and the walls of the canal, that we should afterwards attach to the pavillon of this catheter a caoutchouc bottle filled with water, and that we should push up the injection by making pressure upon the elastic bag by means of a tourniquet; but it is readily perceived that after the principle has been laid down, it is a matter of little importance whether the liquid be projected by means of a syringe, a gum-elastic bag, or by the finger or any other mode. This method, though rational and of undoubted efficacy in certain cases, is far however from deserving those eulogies which some persons have bestowed upon it. If the urine, which is a sort of natural injection thrown from behind forwards, cannot overcome the coarctation, nor make it disappear nor prevent it from manifesting itself, how can we hope that any liquid whatever, merely from the fact that it is propelled in an opposite direction, can triumph over all obstacles? It is therefore probable that the successful results that are imputed to it, might have been full as well obtained by means of catheters or bougies introduced in a proper manner, and that in the majority of the cases injections might have been dispensed with, if the ordinary processes had been employed in a more judicious manner. Nevertheless, as they are of easy employment and unaccompanied with any inconvenience, I see no reason why they should not be made trial of, and even without waiting until all the other means have failed.

### ARTICLE III.—INCISIONS AND SCARIFICATIONS ON THE CONTRACTED PART.

The practice which consists in applying a cutting instrument to the interior of the urethra to destroy its contractions, though it is already quite ancient, and one which Muzell (*Rougemont, Bibl. Chir.*, p. 375,) still eulogized the benefits of, in the last century, has never had many partisans. Besides the almost utter impossibility of reaching only the contracted point, the danger of incising sound rather than diseased parts, and the alarm which it must necessarily give the pa-

tient, this method also has the inconvenience of presenting but a very slight chance of a radical cure, and of rendering the coarctation greater after the cicatrization of the small wounds than it was before the operation. Of two things one must take place: either after the incision has been made, we would leave the canal to itself, and the wound would in this case, from its cicatrizing by first intention, disappear after the expiration of 4 days; or we would keep it dilated by means of catheters or bougies, and in this case we should have secondary cicatrization. Now it is demonstrated at the present day that these secondary cicatrices, when left free, invariably recontract, and reconstitute the coarctation at that point upon which the instrument had found it, if in fact they do not render it more hard and more difficult to be overcome or destroyed. The facts adduced against this course of reasoning prove nothing, since in admitting them to be true, the dilatation employed as an auxiliary to the incision is sufficient to explain the successful results that have been related. But in addition to this we have the fact, that in most instances the incision has not even reached down to the contraction, and if afterwards this latter appeared to have been removed, this was effected only by means of the dilating instruments, which the uretrotomists never fail to make use of immediately after the operation. Finally, experience daily shows that the return of the disease, after the incision, takes place in the same way as after simple dilatation. I have had, besides an infinite number of other instances, two of a remarkable character under my observation, although the two patients, who had each been incised twice, at an interval of a year, had been treated by one of the most zealous and presumptuous scarificators of Paris. This, therefore, is a method which can be applicable only to bridles, and to valvular or semilunar contractions, or to fibrous nodosities, and one which, with these exceptions, would scarcely be made trial of, unless by inconsiderate persons, destitute of accurate knowledge either in anatomy or surgery, or by specialists.

### § I.—*Operative Process.*

Inasmuch as it may happen that in spite of the preceding remarks, some persons may, nevertheless, continue to cry up incisions, and as they may in the last extremity become necessary, in certain cases of well ascertained contractions that are too hard and too thick to yield to the distending action of a bougie, I proceed to point out the manner in which the operation should be performed. Dorner, to whom Siébold and Scemmering ascribe the honor of this process, recommends that we should make use of a sort of lancet, which is to be introduced through a catheter. Physick speaks very highly of an instrument of the same kind: it was a stem terminated in a small fleam (*flammette*), enclosed in a canula of sufficient length, and which was pushed out by making pressure on its free extremity. We find in Dorsey's work two uretrotomes of this description, one which was without any curvature, and which was designed for coarctations of the straight portion of the canal, and the other, which was somewhat more strongly curved

near its point than a female catheter, and which was destined to attack the contractions of the bulb and membranous portion. Randolph alleges that M. Gibson has obtained from these instruments successful results, that no other method could have possibly procured. But who does not perceive that the cutting fleam (*onglet*) of Physick or Dorner, would, in most cases, whatever address we might use, become involved in the tissue of the canal, than in the centre of the obstacle itself, and that in a great number of instances it would leave the contraction itself wholly untouched. M. Despinay, (*Bull. de Fér.*, t. X., p. 278,) who allows of incision only in cases of narrow contractions in form of a bridle, and at the anterior portion of the urethra or neighborhood of the fossa navicularis, for example, recommends that we should make it with a straight, very narrow and blunt-pointed bistoury. The bistoury of Bienaise, or the small concealed uretrotome of M. Civiale, would evidently fulfill this indication better. No one, moreover, can question the advantages of this operative method over that which was followed by Physick. As the incision would be made by a lateral movement, and from behind forwards, it could not expose to the risk of false routes, like that which is effected from before backwards, and beyond the conducting instrument.

M. Ashmead, adopting the suggestion of the practitioner of Bourg, has had constructed a concealed bistoury like that of F. Côme, the sheath of which is prolonged into a blunt or probe point in order to go beyond the obstacle, while the blade has a cutting edge only to the extent of six or eight lines near its extremity, in order that when opened it may incise only the contracted part, and which instrument its author supposes could be applied to every portion of the urethra. M. Guillon, (*Trav. de la Soc. de Méd. Prat.*, 1831, '32, p. 33,) who appears to have been well satisfied with scarifications, has contrived for this purpose sarcotomes and uretrotomes, which are still more ingenious than those of M. Ashmead. M. Tanchou has also invented some. M. Raybard, (*Proc. nouv. pour guérir par l'incision les retrécissements du canal de l'urètre*, Lyon, 1833, in 8vo.,) also in resorting to the incision of contractions of the urethra, makes use of a *bridle cutter* or uretrotome with one or with two cutting edges, and which are terminated by a probe-pointed stem contained in the interior of a catheter. Others, as Dzondi at first and M. Amussat afterwards, have contrived a stilette with four, six or eight cutting crests parallel to its axis, which project to the distance of half a line or a line at most from the circumference of its vesical extremity, which latter should be a little dilated to the extent of six or eight lines. The intermediate grooves are filled in with ointment. This stilette is introduced into a straight canula, through which latter it is conducted down in front of the obstacle. Having reached that point it is pushed upon, protrudes from its sheath and enters into the contraction. The ointment melts or recedes before the resisting point. The small crests thus denuded, slit the contracted circle on different portions of it in the manner of a scarificator. The instrument is then withdrawn. A flexible catheter or bougie is then immediately substituted in its place and left to remain there for the space of at least twenty-four hours, after which it is to be reintroduced from time to

time until the cure is completed. In order that an instrument of this kind may penetrate it is necessary that the coarctation should exist to a very slight extent, for its point, which has to pass first, and which is without a cutting edge, has a diameter of nearly two lines. As the introduction of a sufficiently large bougie could not then be attended with any difficulty, it would be in vain here to try to discover a reason to justify uretrotomy. The same objection is to be made to the instrument of M. Ashmead, as well as to the process of M. Despinay; with this difference however, that this last mentioned uretrotome, from being capable of assuming the form of a bougie or a probe, passes through the obstacle in the manner of a catheter, and does not divide it until afterwards as a secondary operation. As it unites the advantages of the uretrotome with those of conducting catheters or dilating bougies, it may be directed only upon one point or may divide several of them successively at various distances, according to the pleasure of the operator. This is the instrument therefore, or one of those which will be found in the atlas of this work, which would be most applicable should it be absolutely necessary to have recourse to the method of incision.

## § II.

What I have said on the subject of scarifications is to be understood also of *Rugination*. Dionis, (*Cours d'Opérat.*, edit. of La Faye, pp. 272, 273,) who does not believe in carnosities in the urethra, and who considers that contractions in this canal are the results of clap, while he censures the cutting catheter of Paré had suggested this process (rugination) in the 17th century. This however did not prevent A. Paré, (*Œuvres Complet*, &c., p. 536,) who recommends that we should rasp down the carnosities in the canal with a kind of *file*, from being imitated by M. Desruelles, (*Nouv. inst. appelé porte-râpe, pour le traitement des rétrécissements de l'urètre*, &c., in 8vo., Paris, 1836,) who treats coarctation by means of an actual cylindrical rasp introduced in the manner of the caustic holder of Ducamp. The experience which I have had with this instrument has satisfied me that it possesses no utility, and that it will not be retained in practice.

### ARTICLE IV.—EXTERNAL INCISIONS.—BUTTON-HOLE INCISION, (boutonnière.)

Coarctations of the urethra are so frequent, and the accidents which they occasion are so serious, that the ingenuity of surgeons has been constantly occupied in seeking a remedy for them, and the most painful and the most dangerous methods been proposed to effect their removal.

## § I.

Planque (*Bibl. de Méd.*, t. III., p. 253, in 4to,) has published the instance of a surgeon who had the boldness to *lay open the urethra from one end of it to the other*, in order to cauterize and change its interior, and who afterwards united the wound upon a catheter by means of several points of twisted suture, and thus it is said cured his

patient, which practice was generally adopted at Livourne at the time of Solingen. In place of incising it throughout its whole length, a great number of practitioners adopted the method of dividing the urethra only at its contracted portion. J. L. Petit, who was a partisan of this method, did not leave the wound to cicatrize on his S shaped catheter, except after an operation of this kind ; while Lassus, according to M. Dolivera, substituted, in 1786, a gum-elastic catheter for that of Petit. M. Levanier of Cherbourg, (*Arch. Gén. de Méd.*, t. IX., p. 413,) encountering an obliteration which was almost complete, ventured to revive the process of Petit or Lassus, and his bold attempt was crowned with success. Had not several surgeons endeavored to bring this practice into repute again, it could have been dismissed in two words ; but it has been too frequently made trial of for several years past to allow me to pass it over in silence.

### § II.—*Operative Process.*

M. Eckstrom in Germany, M. Arnott, (*Bull. de Fer.*, t. II., p. 81,) in England, and M. Jameson, (*Ibid.*, t. XVII., p. 253) in America, who have derived decided advantages from it, make their incision into the urethra in the following manner. A catheter, or grooved sound, is introduced down to the obstacle, and held there by an assistant. The surgeon raises up the scrotum, stretches the parts with his left hand, and with a bistoury in his right hand, makes a large button-hole like incision on the perineal wall of the passage opposite to the conducting instrument, which latter is to be withdrawn a short distance ; he then endeavors to find the continuation of the urethra at the bottom of the wound, while the patient at the same time makes an effort to urinate ; he now tries to glide into it a probe or grooved sound, which he makes use of as a director for the purpose of prolonging the incision backwards to the distance of some lines beyond the contraction, and terminates the operation by leaving a catheter to remain permanently in the passage and bladder, and upon which it is said the incision soon cicatrizes. M. Lefebvre, of Joinville, (communicated by the author, 9th May, 1839,) in adopting this method, obtained a perfect cure in a man whose urethra had been diseased for a long time.

### § III.

When there is a *complete obliteration*, or the discovery of the aperture of the canal is attended with too much difficulty, M. Groninger recommends that we should incise at hazard as far down nearly as to the prostate, that we should then penetrate through this gland into the bladder by a narrow bistoury or trochar, in such manner as to create an artificial canal, which is to be kept open by introducing into it through the meatus urinarius, as in the preceding case, a catheter which is to be left there, and upon which the whole wound is to close up. If, as Shaw lays it down, (*Bull. de Fér.*, t. II., p. 80,) the contractions were always to be found anterior to the membranous portion of the urethra, and that there constantly exists a dilatation behind them, the operation thus projected might be performed with considerable facility so far as relates to its first stage ; but this is far

from being generally the case, especially in those contractions which succeed to ruptures. M. Cox, (*The Lancet*, 1828, vol. I., p. 278.) who recommends the same method, cites in support of it a fact which he considers among the most conclusive, but which in reality shows rather the extent to which the temerity and fatuity of some practitioners will lead them. The fact is, that the urethra is scarcely ever completely closed up by its organic contractions. In admitting that the simple button-hole slit may be sometimes indispensable, and that forced catheterism, when we find it impossible to pass a bougie, should not be preferred to it, we may at least affirm that this incision ought, with an experienced person, to be sufficient to lay bare the continuity of the canal. Puncture of the bladder would certainly be less dangerous, more prompt, and far less painful than the process of MM. Groniger and Cox. I doubt moreover if any French practitioner at the present day will find himself under the necessity of adopting a course like this, or that the simple button-hole incision itself will be very often had recourse to by them. I would add that this canal of a new formation would not be kept open, and that it would shut up in spite of all our efforts.

## ARTICLE V.—DILATATION.

### § I.—*The Process.*

The treatment of coarctations of the urethra by dilatation, and which is the most ancient known, was for a long time the only one in use. The leaden bougies formerly employed, and again extolled by M. Herzberg, (*Bull. de Fér.*, t. XIV., p. 205,) together with those which Schmidt had constructed with a mixture of lead and of tin, being, though flexible, too hard and too heavy for the urethra to support them without inconvenience,—the *wax bougies*, and those of *gum-elastic*, are the only ones which have continued to be used in practice. The first, which were formerly made of different substances, were especially extolled by Lamna, in 1551, and by Daran in 1745. Since the utility of their medicated properties has been denied, and that their mechanical properties only have been considered of any value, the resolvent, astringent, desiccative, and other materials of which they were composed have been replaced by yellow, white, or red wax, which is reduced to a flexible state. The only qualities exacted of them at the present day, are that of being supple, smooth, insusceptible of melting in the organs, capable of adapting themselves to all the inflexions of the canal, and free from any tendency to break. The leaden wire which some persons place in their centre, in order to increase their solidity, is without any utility. A fine and delicate catgut is better, if we absolutely decide upon not using those which are made with emplastic tissue. M. Guillon, (*Trav. de la Soc. Méd. Prat.*, 1831–2, p. 32,) with a view of having such as were sufficiently strong, though at the same time very delicate, and with a cylindrical, olive-shaped, conical, and dilated (à ventre) extremity, &c., had some fabricated of whalebone. The fact is, I have seen him succeed with bougies of this kind in cases where every other description had failed. Dilating bougies and va-

rious kinds of dilators for the urethra, moreover, have been contrived by M. Montain, (*Therap. Méd.-Chir.*, p. 19.)

A. The *gum-elastic bougies*, which are smoother, more flexible, and still less irritating than wax bougies, have on the other hand the inconvenience of fatiguing the urethra more by their elasticity itself, and their tendency to straighten out, however small a volume they may have; from whence it happens, that even in their character as foreign bodies, they cannot be substituted in every respect for emplastic bougies, as Sœmmering and most moderns allege. The bougies and sounds of *ivory*, *rendered flexible*, as made by MM. D'Arcet and Charrière, from their possessing the pliancy and solidity of the gum instruments, and from their susceptibility of dilating, by imbibing humidity in the passage, would have been generally introduced into practice, in such manner as to remedy the inconveniences of bougies hitherto employed, were it not for their tendency to become dissolved. Both these kinds are of various forms. They are either cylindrical, dilated, or conical, &c. The conical bougies, increasing in volume in proportion as they penetrate, possess the advantage of dilating the constriction rapidly, and of not easily bending in the passage; but they have the inconvenience of a tendency to escape from it, of filling it up too entirely, and consequently of fatiguing it in the direction of their base; and moreover, if they are very much elongated, of protruding to a distance into the bladder before they have acted in a proper manner on the contracted portion of the urethra. It would be necessary that their point, which should at first be sufficiently delicate, should not be farther than 12 to 18 lines from the body of the cone, and that they should afterwards be nearly cylindrical as far as to their base; it being well understood that the bougies below 8 or 6 do not need this modification, which would weaken them without giving them any real advantage.

B. *The bellied (à ventre) bougies* deserve to be more frequently used. The fusiform dilatation of their fifth vesical portion, does not, when it is sufficiently elongated, prevent our making them conical in this direction, while from the manifestly less considerable volume of their stem, they concentrate almost their entire action upon the contraction itself, cause but little irritation in the urethra, and are kept up without difficulty. M. Desruelles, (*Journ. de Prog. des Sc. Méd.*, t. XVIII., p. 143,) adopting this suggestion, has gone so far as to propose that we should substitute for bougies a metallic canula of an inch or two in length, which should be left at the centre of the contracted point, after having introduced it there by means of another instrument, and in such manner to be enabled to retain it by means of a thread fastened outside. But the bellied bougie answers a better purpose. As it enables us to increase the dilatation to such extent as we desire, it causes less pain than the conical bougies. The *action of bougies* or sounds on the contraction has not always been regarded in the same point of view; at the present time we allow nothing more to these instruments, than the property of ulcerating and that of dilating. This is evidently an error. The excentric compression which they make, from its tendency to promote interstitial absorption, may dissipate the inflammation which in so many cases sustains the callosities in the urethra, at the same time that it

may efface and distend them. The radical cure which they obtain more frequently than one would be induced to believe if we credited the relations of certain authors, can scarcely be explained in fact, in any other way than by this remarkable effect. This, moreover, might lead us to believe that it was probably an error to reject medicated bougies in so absolute a manner, and that their topical action has only perhaps been denounced because it was not understood. Those who have adopted the method *by ulceration*, support themselves upon this ground, that a coarctation which has been merely dilated must necessarily return as soon as we dispense with the use of the dilating body, but that by effecting a loss of substance, we must on the contrary obtain a permanent enlargement of the canal. E. Home in still maintaining a doctrine of this kind, has committed a double error. On the one hand, a return of the disease does not inevitably follow the dilatation; while on the other, the ulceration involves a loss of substance, the cicatrization of which would be much more certain to reproduce the contraction. Moreover, there is nothing to show that we could in reality produce this contraction at pleasure. A bougie introduced forcibly into the *infundibulum* of a coarctation, or kept pressed into the middle of the contracted circle, irritates and more promptly dilates, but does not ulcerate the part, or at most does nothing more than excoriate it.

D. *The medicated action* of bougies being laid aside, though it may one day be revived, no other important point therefore remains to be considered than their distending power in its various degrees and under its different aspects. This effect is certain and almost unavoidable; but it possesses the inconvenience of not being maintained with sufficient permanency, and that also of being limited in the greater number of patients who submit to it, to the palliation of the disease instead of curing it without a return. Nevertheless, those coarctations which are not produced either by a bridle, or valve, or projecting cicatrix, nor by vegetations, of whatever nature they may be, but which arise from a pure and simple, or inflammatory, or other induration of the mucous membrane and subjacent organic tissue, are however in a considerable number of cases permanently removed under the action of a dilatation properly performed. Moreover all that would be required to prevent a return, would be to replace the bougie every month, and afterwards every two, three or four months, and to keep it in for the space of several hours, which precaution will be so much the less irksome to patients from its being very easy for them to perform the operation themselves.

## § II.—*Operative Process.*

When the urethra is very much contracted, the passing of a bougie is not always an easy matter. If it is too small it bends before the slightest obstacle, while if it is a little larger, it is not possible for it to enter. The catgut bougies, which are stiffer and have more force under a smaller volume, present some advantages under such circumstances. Delpech recommends that we should flatten and bite their point a little, in order to transform them into a kind of supple and flexible pencil; after passing through the obstacle he withdraws

them at the expiration of two hours; he then introduces one a little larger and renews this after the same interval, and replaces this again the same evening when he considers it practicable, by a bougie or sound of gum-elastic. The distension they undergo gives great value to a dilating instrument under such circumstances; but as they become twisted, softened and knotty, we should incur the risk of breaking them or of abrading the urethra, should we delay changing them every two or three hours.

A. *Hollow Bougies*.—In many cases also a small catheter or hollow bougie is more convenient to commence with. The stilette, which it is furnished with, ought to be well curved as far as to its point and possess all the strength possible. The whole is then to be introduced into the bladder according to the rules of catheterism. Moreover it is prudent to have at the same time in our case, catheters, bougies and catgut-sounds, in order to be enabled, when necessary, to make use of these instruments in succession. There cannot be any fixed position for the patient. We sometimes leave him standing up, or make him sit down, or place him in a horizontal position. The penis, which is generally held slightly raised up, requires in other cases to be a little depressed or drawn forward. The patient, guided by the sensation he experiences and the resistance he feels as soon as the point of the bougie deviates from the axis of the canal, will sometimes succeed with the instrument at a time when the most skillful surgeon would have failed. The failure of a first attempt is no argument in respect to the second. A thousand particularities, which practice alone will enable us to distinguish, may oppose us at first and a moment afterwards enable us to succeed. In fine, we proceed nearly in the same manner as for catheterism. The penis is held in the left hand and the bougie pushed in with the right. The smallest kind easily become caught at the bottom of the lacunæ of Morgagni, or in the slightest duplication of the canal. Should there be ever so little resistance, we must, after having withdrawn it a few lines, turn it in the manner of an axis between our fingers, while continuing to push it forward near the difficulty. A cul de sac, or fold, or false direction, or rugosity, or the projection formed by the coarctation itself, may arrest its march. It is under such circumstances, particularly, that we must make it progress with caution, bring it back towards us, vary its inclination, turn it between the fingers, and favor its passage by means of the forefinger resting upon the perineum. We know that it has entered into the contraction when, without any inclination to advance farther, it has no tendency to recoil, and is found as it were compressed at its point. We may be certain of the contrary, whenever it springs back as soon as we cease to make pressure upon it, and that it offers no resistance to the hand when we are disposed to withdraw it. A practised person will not be deceived, and will appreciate better than can be described, the difference which exists between a bougie which is *fastened* in the coarctation and one which is only *stopped* by it. In the first case, as it can only be prevented from passing on by its excess of volume, we have nothing more to do than to replace it by a smaller one, or to fix it at the point in which it has entered. In the second case, we repeat our attempts

in every possible way, using a larger or a smaller bougie, or one of another form or of another description. Finally, we may fix it in the point of the urethra which it has entered, provided its extremity has not bent up. It not unfrequently happens that when arranged in this manner, it will of itself overcome the obstacle, and that at the expiration of a half an hour we shall find that we can make it advance to a considerable distance with the greatest degree of facility. This course, which was adopted by Dupuytren, enabled him to succeed in numerous instances, and in some cases where success was un hoped-for. Should the passage appear to be too much irritated or in too painful a state, or if it should bleed copiously or become spasmodically contracted, every manœuvre is to be suspended, to return to them at a subsequent period when these accidents shall have subsided. Those *emplastic bougies*, in which we have taken the precaution to give them a curve near their extremity, cannot, it is true, be any longer rolled between the fingers, but they accommodate themselves better to the direction of the parts, and in some certain cases surmount a difficulty which has resisted all the other kinds. Dipping the penis in cold water, warming the instrument before introducing it, covering it with cerate after having oiled it, or besmearing it with pomade of belladonna or opium, will sometimes render that easy which seemed to be impossible. A long, blunt-pointed probe, with a ring outside, and pushed in while turning it around, has full as well succeeded with me in many difficult cases, as it did with MM. Bell and Vanvelsnaer, who proposed it in 1814 and 1821. Its button extremity is an excellent means of overcoming the most irregular coarctations, and enables us in this manner, as M. Ségalas has remarked, to measure the extent of the contraction.

B. I will now suppose that the bougie is finally *adjusted* in its situation. In order to fasten it we confine ourselves, if it is an emplastic and dilated one, to bending that extremity which is near the glans penis into the form of a hook or ring. When it is cylindrical or merely conical, it is necessary, moreover, to invest it with a cundum or a small sac of fine linen, which at the same time envelopes the penis. The gum-elastic bougies require, in this respect, the same attention as catheters that are to be left to remain in, and which have been mentioned farther back. The time proper to leave in the first ones varies according to an infinite number of circumstances, that is, according as the canal is more or less irritable or sensitive, or sound, moreover, or diseased, or whether the person experiences a greater or less degree of pain from the bougie, or the coarctation has existed a greater or less length of time, or is more or less decidedly marked, and according to the effect also which we wish to produce. It rarely happens however that it is to be left in for less than half an hour, or than one or two hours, or more than twelve or fifteen hours, and it may remain as long in fact in general, as the patient can support it without experiencing too much suffering. If the patient experiences an urgent desire to urinate, and the fluid cannot make its escape between the walls of the canal and the foreign body, the conical bougies have in addition this advantage, that by withdrawing them a little the urine passes with facility, and that we may readily replace

them afterwards at the same depth as before. The flexible catheters, whether cylindrical or conical, and the hollow bougies, are valuable in this respect, that it is unnecessary to change them in order to empty the bladder, and because certain patients cannot retain their urine over an hour, or even not as long.

C. Nor can there be any fixed rule in respect to *the interval of time between each application*. We are sometimes obliged to wait two or three days, while in other cases the system becomes so quickly habituated to it, and is so little disturbed by it, that we may repeat the application on the following day. In renewing them, we take one which is of a little larger size, as often as the last made use of has begun to pass freely into the urethra, but as the conical bougies become larger and larger in size in proportion as they penetrate, they do not so absolutely exact this reapplication. The more we advance in the treatment, the more frequently do we make the applications, and the longer do we protract their duration. It may be laid down as a principle, that every contraction which can be traversed by a bougie, however small the latter may be, may be cured by dilatation. This treatment, which is so much the longer in proportion as the stricture is so much the more indurated and more resistant, and according as the patient is more excitable or more difficult to control, is sometimes not terminated until after the expiration of two or three months; but I have acquired the conviction based upon a sufficiently extensive number of observations, that we may in the majority of patients succeed in the space of from 20 to 30 days in restoring to the canal in this manner its natural dimensions, especially by means of the conical bougies.

D. I have even frequently obtained these *dilatations in the space of 6, 8, 12, or 15 days*, in patients in whom the contraction was of several years' standing, and in some other patients who had been already treated either by bougies or cauterization, but in whom the cure did not remain permanent. Since I have mentioned this manner of dilating the urethra, it has found distinguished partisans. M. Lallemand, (*Pirondi, Gaz. Méd.*, 1835, p. 764,) who employs it under the title of *sudden dilatation*, and who administers copaiba with the intention of temporarily dilating the urethra before the introduction of the first bougie, has derived excellent results from it. M. Lasserre, (*Bull. de l'Acad. Roy. de Méd.*, Paris, 1839, t. III., p. 603,) who with the intention of suddenly enlarging a contracted urethra, introduces successively into the bladder 12 numbers of the sound, does no more than follow my practice. Finally, the dilatation which M. A. T. Chrétien (*Bull. de Ther.*, t. XVI., p. 288) eulogizes under the title of *sudden dilatation*, is also scarcely any other than an exaggeration of the process which I have just pointed out.

E. Moreover, I know nothing of the dangers with which dilatation of the urethra is generally reproached, nor of the pains that certain authors ascribe to it. When systematically performed, I have rarely seen it produce severe accidents. The mucous, or blenorragic exudation, that it sometimes occasions, almost always disappears of itself after having lasted a few days. The fever, preceded with trembling, and followed by sweats as in intermittent fevers, which it causes in certain cases, has nothing alarming about it. The nervous

symptoms, and engorgement of the cord or testicles, are exceptional accidents, which are not more frequently caused by the employment of bougies than by the most simple form of catheterism. A patient, however, upon whom I had used this process at La Pitié, was seized with symptoms which it is proper to notice. A conical bougie had been passed after several trials. One morning this man, wishing to introduce it himself, by its head, (*chef.*) could not succeed, and made the canal bleed. The exacerbation of fever, which had accompanied the first attempts, was renewed, and continued three days, and did not cease on the fourth until it was replaced by a violent tibio-tarsal arthritis, which was followed by an extensive abscess, and afterwards by ankylosis. It is true that this leg had been fractured above the malleoli six weeks before. Was this a coincidence, or was it an effect of the same kind as those which are quite frequently caused by blenorragia? The objections which may in reality be made against this mode of treatment, are that of exposing to a return of the disease, that of requiring that the dilatation should be carried beyond the normal dimensions of the urethra, and that the bougies cannot be abruptly laid aside, but must continue to be made use of from time to time during the space of at least several months.

F. *A small cylindrical or fusiform pouch*, supported by a probe and contained in a flexible canula, and thus suddenly introduced into the contraction and then filled by insufflation, forms an air dilator, which, according to Ducamp and M. Arnott, ought to be substituted for dilated bougies, and presents the important advantage of forcibly distending the coarctation without having the slightest action on the rest of the canal. At the present day we know that this is not the case; but that the small bladder necessarily adapts itself to the urethra, and that it presses full as much on this side and beyond as upon the contracted circle itself. *M. Costallat* has shown me another apparatus of this kind, which is composed chiefly of a long tube made of fine linen, which is introduced into the bottom of the urethra by means of a flexible tube. This tube, which terminates in a cul de sac at its vesical extremity and is open and has a ring at the other extremity, is destined to receive small portions of lint or cotton, which, by means of a forked stem, are pushed and crowded into the coarctation in such manner as to obtain as rapid and progressive a dilatation as may be desired. However ingenious these inventions may be, I doubt if they will be adopted in practice. As bougies almost always enable us to attain the same object, they deserve, by their simplicity, the preference that they will probably almost always have.

### § III.—*Contraction of the Meatus.*

In man the coarctations of the urethra scarcely ever take place in the *prostatic region*. As this canal, unless it is stretched, has scarcely more than four to five inches in front of this gland, we may from that conclude that any operation performed at more than six inches of its depth, can no longer have relation to a contraction of the urethra. At the *bulb* and in the *corpus spongiosum*, and up to as far as an inch from the prostate, the coarctations of the ure-

thra should be treated in the same way as those of the *membra-nous portion*; but at the meatus they require some special precautions. Their incision is then so easy a matter that we ought generally to give it the preference, or make it the point of departure for the rest of the treatment. The ordinary crayon of nitrate of silver replaces, under these circumstances, the other instruments. To effect the dilatation we have no need of a bougie. A sort of a plug of adhesive plaster rolled up on its spread side, and an inch long, and which the patient withdraws and reintroduces himself every time he has occasion to urinate, is used in place of a bougie.

#### § IV.

*In women*, the contraction of the urethra, three instances of which I have seen, and a case of which, where it was formed by a sort of valve, was noticed by M. Manneç, (*Bibl. Méd.*, 1829, t. II., p. 443,) and another instance of which was also seen by M. Larcher, is to be treated in the same way as those of the region which I have just been speaking of in man.

#### ARTICLE VI.—CAUTERIZATION

The surgeons of the 15th, 16th, and 17th centuries, considering that contractions of the urethra depended upon vegetations and fungosities, were in the habit of treating them by caustics. Verdigris, vitriol, savin, and alum, mixed together into emplastic compositions, which were shaped into bougies, were employed for this purpose. A. Ferri, A. Paré, F. de Hilden, and Rivière speak of it as a method in very common use and frequently dangerous. It is known that Loyseau ventured to have recourse to it upon Henry IV., and that Limonier, Wiseman, and Roncalli also extolled it. But in the last century it was scarcely any longer as much spoken of. But for the improvements and ameliorations which it has received from the hands of Hunter, E. Home, Arnott, Ducamp and several others, this method, which has ultimately succeeded in being adopted, might have been, without any inconvenience, allowed to remain in the oblivion into which it had fallen.

#### § I.

*The nitrate of silver*, substituted in the place of sublimate and other caustics which were first employed, has, it would seem, diminished its dangers, and reconciled to it a number of persons. By demonstrating afterwards the possibility of touching only the diseased part, confidence has finally been imparted to the public and cauterization of the urethra been made, so to speak, a common method. It is not however to be supposed that Ducamp was the original author of these improvements. *The impression bougies (bougies à empreintes)* were in use at the 16th century. F. Germain and L. Muzell, (*Rougemont, Bibl. Chir.*, p. 372) also advise that we should ascertain the seat and form of the contraction with the extremity of an emplastic bougie, and then withdraw it and remove a layer from its

point, in order to substitute in the place of this some caustic substance, which is to be reintroduced upon the bougie thus *armed* into the contracted canal, in the same way as was done at the time of Dionis, (*Cours d'Opérat.*, edit. of La Faye, p. 273.) The process of Home, which consists in attaching a small quantity of nitrate of silver to the point of a bougie, to be introduced down to the contracted part, scarcely differs from that of Germain or Muzell. We see also that Paré anticipated Hunter by proposing a canula to protect the urethra, while we introduced the bougie charged with caustic, and left it to act. Limonnier also, as M. Dezeimeris remarks, knew how to search out for the difficulty, and to take the imprint of it by means of wax before proceeding to cauterize. F. Roncalli, in the year 1720, moreover made use of the same caustic that Hunter did, or the same process as Paré, and the practice of Wiseman was so much in use at the time his countryman was trying it that Alliès, in 1755, complained of the fatal accidents which it frequently produced at Paris. Notwithstanding the remarks and modifications of M. Wathely, the method of Home, introduced into France by M. A. Petit in 1818, (*Revue Méd.*, 1837, t. III., p. 360; *Bull. de la Fac. de Méd.*, 7th année, p. 106,) had been so severely censured by MM. Rawley and Carlisle among others, that even in England it continued to be the subject of various prejudices, and that the memoir of M. Arnott, based upon the same principles as that of Ducamp, produced scarcely any sensation at London in 1819, no more than that of M. Macllwain, published in 1830, will bring into repute the use of potash extolled by M. Wathely in similar cases.

## § II.

*Cauterization from before backwards*, with or without a conducting canula, has almost entirely disappeared from practice since the time that Arnott and Ducamp made known their method. If, after the example of M. Leroy, any persons should still incline to make use of it, the armed bougie of Home and of M. A. Petit, from its being flexible, ought to have the preference for those contractions which are situated near or beyond the bulb. If it is pushed rapidly in, it will not without difficulty allow the caustic, which is upon its point, to touch the walls of the urethra before it reaches the contracted infundibulum; we then push it in a little farther; the nitrate now melts, and we then draw out the instrument at the expiration of about a minute. When the obstacle is at less depth, the canula of Roncalli or of Hunter may be employed without any inconvenience. M. Chas. Bell and Shaw considered that the beak of a metallic catheter, which should be straight or curved, according to circumstances, and pierced in the centre if the constriction is central, and on the side in the contrary case, would fulfill with more certainty the same indication, by giving us all the liberty desirable to introduce and protrude from one of these holes, a piece of caustic, either by means of a bougie or a long forked probe, or any other appropriate instrument.

## § III.

*Lateral cauterization* exacts more precautions, and is performed by various processes, which all belong to the same method.

A. The apparatus of Ducamp consists of: 1st, an *exploring* sound, designed for ascertaining the depth at which the constriction is placed; 2d, an *impression* bougie, having a certain quantity of soft wax at its extremity; 3d, a *conducting* catheter, having a platina socket at one end, and enclosed in a silver tube at the other; 4th, a *caustic-holder*, consisting of a small platina cylinder, hollowed out by a slit on one of its sides, and having near its root a transverse pin, to prevent it from going beyond the beak of the conductor, and also having a flexible stem, which it is screwed upon, and which is continuous at the other extremity with a metallic probe armed with a ring. The small socket of platina is filled with fragments of nitrate of silver before screwing it upon the flexible stem. Always taking care to grasp this between the branches of a strong pair of forceps, we then place it above a taper or candle with a steady flame, in order to melt the caustic slowly, and that it may not bubble up, as frequently happens when it is too quickly heated, or when the socket has not been well cleansed and dried. Nothing further remains than to regularize the whole, by grating down the projections or asperities which may have formed, by means of pumice-stone, or the cutting edge of any instrument whatever. We may then commence the operation, after having accurately determined with the exploring instrument, the place where the obstacle is situated. The impression bougie is the first which is introduced. It is kept for a moment against the contraction, when the soft wax fills it up and gets lodged in its passage. It is then withdrawn, and the size of its elongated point furnishes the measure of the diameter which is to be traversed, at the same time that the impression which is transmitted should indicate to us whether the coarctation is central or circular, or in the contrary case on what part of the urethra it exists. The conductor is then introduced to the same depth, where it is held with the left hand, after which we seize with the right hand the ring of the caustic-holder, which is to be pushed in in such manner as to protrude the platina cylinder, charged with nitrate, while turning its socket towards the diseased wall, so as to make it enter in fact into the contracted circle. The wings of its pin are arrested within the socket of its conductor. We leave it a minute, or only half a minute in contact with the tissues. After having withdrawn it into the interior of the catheter, we remove the whole apparatus, and the operation is terminated. In acting in this manner we cannot, should there be several contractions existing at the same time, attack the most remote, until after having destroyed in succession all the others. The matters which the organ secretes, from being liable to get into the conductor, quite frequently dissolve the nitrate before it can become lodged in the contracted passage.

B. M. Lallemand is one of the first who endeavored to remove this inconvenience. His caustic-holder, which is terminated by a button, and the whole of which consists of one piece, together with the stem which gives it motion, is straight or curved, according as it

is intended to penetrate to a greater or less distance, and enclosed in a platina catheter or sheath, having the same shape and a greater diameter than is necessary, in order that it may be adjusted with accuracy upon the socket or swollen portion of the stilette. A running ring, armed with a pressure screw, embraces the conducting canula. The stilette has at its other extremity a lenticular button or nail, which is not adjusted until after having inserted the instrument from behind forwards into its sheath or canula. By drawing it towards us, the slight dilatation of its head completely closes up the vesical extremity of the catheter, and transforms it into a blunt point. It is introduced in this manner, shut up, into the urethra, and as an explorator as far as the bladder, in order to satisfy ourselves that there is no longer any obstacle remaining. If there are several of them, we may stop upon the last full as well as upon the first, and cauterize them from behind forwards, or from before backwards, either in succession or all at the same sitting. When it is inserted, we bring down and fasten the running ring on a line with the meatus urinarius, in order not to lose sight of the distance at which the contraction is situated. By afterwards drawing the sheath towards us, the socket of the stilette is disengaged and strikes naked upon the diseased tissue. For the purpose of closing it up in order to withdraw it, or for pushing it in and bringing it into contact with other contractions, it is a matter almost of indifference, whether we make the sheath move on the stilette, or the stilette in the interior of the sheath, by pushing one in or drawing back the other. In this apparatus several stilettos are necessary if the instrument is curved, because from being wholly metallic, they cannot turn on their axis in the interior of the canula, and that their socket has necessarily a fixed point. Thus, it is necessary to have such as have the socket on the concave border, some with the socket below, and others that have it placed on the side. We must also have them of different sizes, together with sheaths whose calibre must proportionally vary.

C. M. Ségalas, with the view of preserving the advantages of the instrument of the professor of Montpellier, without losing those of the apparatus of Ducamp, makes use of a stilette, which in its fourth inner portion is formed of small links of a chain, like the lithotritor of M. Pravaz, and by which he is enabled to execute all the movements of rotation required, and to turn his socket towards the different points of the diseased circle in succession. Moreover, in order to make it penetrate down to the first contraction, he incloses it armed with its sheath in the conducting catheter of Ducamp.

D. M. Pasquier, instead of a pin, has placed a circular border behind the socket of the caustic-holder, in order that he may not be compelled to turn at the same time, both the stilette which is charged with the nitrate, and the conducting tube, as in the process of Ducamp. The other modifications made by this surgeon are of little importance, and may be adopted or rejected without any inconvenience. Moreover, he has disengaged the original method of its impression-holding bougies, and its exploring sounds, and, according to M. Racine, recommends that the treatment should be commenced with dilatation, by means of ordinary bougies, in order that

we may at the very first, carry the caustic down to the coarctation which is most remote.

E. Some persons have supposed that they could give still greater facility to the movements of the stilette or *mandrin*, by giving a greater length to its outer portion which is metallic, by cutting it in the form of facettes, in order that the pressure-screw of the pavillon of the conducting canula might be better adapted to it, or in dispensing with the necessity of this screw, by terminating it in a forceps head, one of the branches of which would be free, and have transverse grooves upon it, which could fix it in a proper manner into the square opening of the pavillon of the sheath, while the other would be continuous with the stilette itself. Others, *M. Dieulafoi* for example, make use of a canula, which is perforated upon its side, in order that the socket, which is charged with the caustic, might by this means come in contact with the interior of the canal. These slight modifications, in my judgment, are of a character not to be neglected.

F. *The stilette (mandrin) which I employ* in preference, when I do not use the instrument of *M. Lallemand* improved by *M. Charrière*, is a silver one with a platina socket, and has no border, but is furnished with a button, and also with a packet of silver wire rolled round in spiral form, in order to make them flexible and less liable to break. Its free extremity, which is a sort of watch-spring, 12 to 15 lines long, is inserted in the fixed branch of the forceps head which I have just mentioned, in such manner that it may be arrested in it by a pressure screw or withdrawn from it at pleasure. Its sheath is nothing else than the flexible canula of *Ducamp*, into which I insert it from behind forwards, but not until after having curved it, if I consider it necessary, in the same manner as a stilette of a gum-elastic catheter. The forceps head being adjusted, nothing more remains to be done than to draw upon it in order to shut up the whole instrument, and then to apply the button of its cauterizing extremity, over the opening of the conducting canula at the inner end of this last. Its flexibility enables us, by curving it before the operation, to turn the socket upwards, downwards, or to the side. Its head prevents it from making a false route and secures the caustic from the action of the moisture of the canal. All that is necessary to make it advance, is to approximate the two branches of the forceps head by means of the thumb and forefinger of the right hand, to attach that which is free alongside of the other in the pavillon of the canula, and to push them in together while the left hand holds the body of the instrument immovable in the penis.

#### § IV.—*Appreciation.*

The principal advocates of cauterization have greatly insisted upon the necessity of determining not only the distance at which the contraction is situated, but also its length, thickness, form and position. In regard to the first no difficulty exists. Any blunt-pointed bougie whatever will be sufficient, and will give full as much information as the explorator or impression-holder of *Ducamp*. It is not the same with the second question. The emplastic or gum-

elastic bougie charged with soft wax, and which the same author advises should be carried down upon all the contractions at the same time, with the view of thereby obtaining their various impressions by one operation, does not possess the slightest value. A long probe with a spherical head is infinitely more certain. This probe, if inserted in the manner of a stilette in a blunt-pointed catheter, or introduced by itself, will come down upon the obstacle. We then mark the corresponding figure at the meatus urinarius, if it is not marked at the pavillon of the catheter. It passes beyond the resisting point, which stops it a little, when we withdraw it, and the extent of which by this mechanism may be very easily measured, since we may mark its point of departure and point of retreat at the outside. The questions of thickness and form present more embarrassment. The impression-holder of Ducamp is a deceptive instrument, which deserves no confidence, and which can scarcely subserve any other purposes than the interests of charlatanism. Having arrived into the urethra, its moulding wax may be indented full as well by the action of a fold, or spasmodic movement, or momentary flattening of the canal, as by the presence of an actual coarctation, and I could never comprehend how upon the evidence of this instrument alone practitioners of respectability could venture to have recourse to the nitrate of silver. How many urethras have been cauterized without necessity, because the bougie of Ducamp, when it has come out indented, has given rise to the delusive idea that coarcations existed ! M. Pasquier, therefore, was right in proscribing it, and it is an instrument, in my opinion, which ought to be banished from surgery. M. Amussat (*Arch. Gén. de Méd.*, t. XIII., p. 294) has proposed to substitute for it a straight canula, furnished with a stilette whose extremity, shaped like the head of a nail or lentil, shuts up the opening and constitutes its beak ; but the arrangement of which is such that the handle is fixed a little to the outside of the centre of the terminal plate. Being once adjusted in its place, we hold or cause to be held the canula immovable with one hand, while with the other we push forward the mandrin ; the rasp passes through the obstruction ; we then turn it upon its axis, and its cutting border laterally, immediately projects beyond the line of the sheath ; in bringing it back we graze the corresponding wall of the canal, which is sound and regular if it encounters nothing, but diseased on the contrary and contracted in those cases where tissues, or a bridle, or a crescent-like projection arrest the instrument and separate it from the canula. This instrument, which does not materially differ from the uretrotome of Paré, except that it is straight instead of being curved, and not less faulty, moreover, than the bougies of Ducamp, would be still more dangerous, and besides could not succeed except on very wide contractions. We shall see, moreover, farther on, what necessity there may be of such precautions in practice. Among so many instruments then, which are those which ought to be preserved ? The apparatus of M. Lallemand would evidently be the best, if it were indispensable to pass in succession through all the contractions where several of these exist. That of M. Ségalas would possess the same advantages, if it were less complicated. Finally, it is the apparatus of Ducamp, modified by M.

Pasquier, or the instrument which I have made use of, as improved by the cutler, Charrière, to which I would give the preference, if it were necessary to adopt one to the exclusion of the others. But it is the same with cauterization of the urethra as with all other operations. In the hands of a skillful person all instruments are good, while in the contrary case there are none that are convenient.

*A. Results.*—Whatever may be the process adopted, the character of the results produced is always the same. While the nitrate is naked in the urethra the patients experience a pain and sensation of burning or broiling, which is obtuse in some and very acute in others, and which afterwards continues to a greater or less length of time. These differences are owing to several causes: 1st, because the cerate, lard or oil which remained about the caustic have enveloped it and prevented it from acting; 2d, because the indurated tissues of the contracted circle have almost completely lost their sensibility; 3d, because the caustic comes into contact with some part of the sound tissues and spreads in front or behind the contraction; and 4th, because the canal is already the seat of an irritation or of a greater or less degree of morbid sensibility. When there has been no false route made and the caustic does not run, the pain in general speedily subsides, and blood does not always make its appearance. In any event a general bath is useful, in order to prevent the accidents, and should be had recourse to immediately or during the course of the day. When the coarctation exists to a great extent, or that the cauterization has been actively applied, it may happen that the congestion and tumefaction will cause a retention of urine, which in other circumstances may be produced by flocculi or foreign matters and eschars that have become arrested in the centre of the obstruction. These are easily removed by a fine bougie, baths and tepid injections. Should inflammation be threatened we apply leeches to the perineum. On the following, or on the second or third day, thread-like shreds of a grayish, blackish or whitish color, issue with the urine from the urethra, and again render this emission considerably painful. These discharges, however, do not necessarily occur, and frequently they are entirely wanting, even though the cauterization may have produced a very decided effect. It is to be renewed as soon as the erethism has subsided, that is to say, at the expiration of three, four, five or six days. In the interval some persons apply from time to time a bougie for the space of some minutes, and in this I think they have reason. Others allege that we should not have recourse to dilating means until after having destroyed the obstruction, which latter requires in this event from four or six to thirty or forty cauterizations, and consequently a treatment of from fifteen days to three or four months.

*B. Theory.*—The partisans of cauterization, with Hunter at their head, maintain that dilatation is nothing but a palliative means, almost always followed by the return of the disease, but that to obtain a cure free from all danger of a return, we must not efface and dilate the induration, but in fact destroy and erode it, which is done by the employment of caustic. After which the bougies come in to regularize and complete the cure. Their antagonists reply, that the loss of substance caused by the caustic must necessarily leave a hard,

elastic, irregular cicatrix, which will almost inevitably reproduce the coarctation ; that in this respect the cauterization is still more liable to be followed by a return of the disease than dilatation, and that being incomparably more dangerous, it is not understood what should give it the preference ; and that in order to act, the caustic-holder requires a canal which still has a width of a line at least, which diameter always admits of the employment of a bougie, and that these last frequently pass where the caustic socket cannot penetrate. Setting out from the first objection, they demand what advantage there is in cauterization, since in all cases where it is applicable bougies may be substituted for it, and that they ought moreover to precede and to follow it in almost every case. These arguments have not been triumphantly refuted, nor could they be by those persons to whom they are addressed. To oppose them it has been found necessary to consider cauterization under another point of view.

*Nitrate of silver modifies the vitality* of the parts touched much more than it destroys them. In the urethra, it extinguishes the chronic inflammation which has produced and which almost always keeps up the contraction, in the same way as it destroys a great number of inflammations on the skin, as herpes, zona, and pustules of small-pox ; in the same way also as it destroys certain anginas, aphthæ, ophthalmias, &c. It is by this action, and not by ulcerating, that it dries up ancient discharges, which are situated sometimes in front and sometimes behind the bulb of the urethra, and it is by this that it has procured such remarkable success in a great number of lesions, which are independent of all kinds of coarctation. But upon this hypothesis also, it would be necessary, instead of attempting to ulcerate, destroy, or in a word cauterize, that we should confine ourselves as much as possible to the simple touching of the parts with caustic, and to consider the nitrate of silver not as an actual caustic, but as a special topical application, intended to disperse (*sufflaminer*) the morbid cause, and at the same time to favor the resolution of the lardaceous engorgement and the absorption of the matters that have become effused or concentrated in the laminæ of the mucous membrane or subjacent tissues. From hence it follows that the potash which M. Wathely recommends, as a substitute for lunar caustic, is a dangerous means, which should never have been put in practice. We could explain in this manner the results obtained by the medicated bougies of the ancients, and how it happens that all kinds of cauterization have been enabled to succeed. With these principles, and which are those to which I have conformed myself since the year 1828, (Nivert, *Thèse*, No. 100, Paris, 1830,) the employment of nitrate of silver becomes a matter of extreme facility. The impression holders are no longer of any value, since all that is necessary is to introduce the caustic into the coarctation by any instrument whatever, without troubling ourselves to know whether the obstruction is shorter or longer, or above or below, since in dissolving it spreads itself almost immediately over the entire circumference of the canal. Also, the conductors which are pierced outside of the centre of the platina socket, which caps their extremity, in order to separate the caustic-holder from the sound wall of the urethra, and to apply it, on the contrary, with the greater accuracy upon

the wall which is diseased, thus lose all their value. The bougies and the caustic then march in the front line; the first to dilate and enlarge, and the second to cure and to restore to the tissues the characters which they have in their normal state. Thus to dilate at first, and not to cauterize for the first time until after having made use of the application of bougies four or five times; to continue the dilatation; to cauterize a second, and then a third and fourth time at various intervals; and to repeat it even once or twice, though the canal has been enlarged to its maximum diameter, in order that we may remove the last traces of inflammation or morbid irritation which may have remained there; these constitute in fact the whole treatment in a great majority of the cases of organic coarctations of the urethra.

#### ARTICLE VII.—TREATMENT BY TOPICAL APPLICATIONS.

This doctrine induces me to believe that the ancients were not perhaps wrong in introducing topical applications upon coarctations of the urethra. M. Bretonneau, who after combining sublimate, white precipitate, tutty, &c., with ointment, lard, or wax, besmeared a bougie with these preparations, had already persuaded me in 1830 to introduce them by means of protecting canulas, as far as into the interior of the contractions. Since that period alum, which was formerly employed, has been again brought into use by certain practitioners. M. Legrand (*Gaz. Méd.*, 1836, p. 554) places it in a groove on the side of an emplastic bougie, and in this manner introduces it into the urethra; but it is evident that M. Jobert, (*Gaz. Méd.*, 1836, p. 554,) when he confined himself to covering an oiled bougie with it, did not, as he supposed, introduce this substance as far as the coarctation. With a view of treating affections of the urethra in the same manner as diseases of the skin or mouth, by pomades or alum in powder, I made use for this purpose of a very simple and very certain means: I untwist laterally the end only, or the side as well as the end of a wax bougie, in such manner as to form a little cup or gutter there, which I fill up with the medicated matter selected, and which I immediately shut by rolling it so as to give it its original form. Having introduced it armed in this manner as far as to the diseased part, I have nothing more to do than to turn it on its axis in an opposite direction to its natural twist, in order to disengage the medicated substance which is thus found in contact with the walls of the urethra. I have had every reason to be satisfied with this process.

#### ARTICLE VIII.—CONTRACTION RESULTING FROM A LOSS OF SUBSTANCE IN THE URETHRA.

Should the urethra have become contracted in consequence of a wound, rupture, or any loss of substance whatever, the cure in general is attended with an extreme degree of difficulty. M. Denis (*Journ. Hebdom.*, 1835, t. II., p. 9,) finding that the disease in a case of this kind resisted every remedy, came to the resolution to leave a catheter remaining in the canal. The cure in another case was not effected until an incision and the button-hole cleft was had recourse

to, (*Journ. des Conn. Méd. Chir.*, t. III., p. 37.) The same was the case in the patient of M. Lefebvre. I have seen a great number of cases of this description. Dilatation, scarifications, cauterization and topical applications succeed here at first, as in other cases; but the urethra will not be left alone three days before the disease is again reproduced. As there is in the cases in question a kind of fistulous collar, or track of a new formation, and of tissue which is foreign to the natural canal, it contracts as soon as it is freed of the dilating body and left to itself, from whence it may be conceived how difficult it must be to effect a radical cure of a coarctation of this description. It would be to these cases only that incision, as employed by MM. Arnott, Jameson, Cox, &c., or excision of the cicatrix, would in fact be applicable. The thesis of M. Mahot (*Thèse*, No. 113, Paris, 1837,) will convey a sufficiently correct idea of the coarctation of which I am here speaking.

[*Organic Contractions of the Urethra*.—M. Cruveilhier has been one of the first to disabuse the public of the erroneous belief, which had long prevailed, of the frequent existence of various forms of organic contractions of the urethra. In a recent work, (*Reflexions et Observations, &c.*, see *Annales de la Chirurgie*. No. 14, also *Arch. Gén. de Méd.*, 3e ser., t. XV., pp. 102, 103.) he states that he has never met with but one single description of these organic alterations, viz., the fibrous transformation of the walls of the canal of the urethra. This he says may constitute a mere circular constriction or ring, or it may have a breadth of from 6 to 12 lines, or even more. They may implicate the mucous membrane only, or the entire thickness of the tissues of the canal. Most frequently they are situated in the membranous, and *never in* the prostatic portion of the urethra. The pre-existence of an ulceration is a more rational explanation of such strictures, M. Cruveilhier thinks, than a chronic inflammation, as it is difficult to conceive how the latter could be so circumscribed in its extent. From these data he deduces the following conclusions: the inefficacy of forced catheterism and conical sounds, the preference of dilatation over cauterization, the necessity of long-continued dilatation, the tendency of such contractions to be reproduced, and the absolute incurability of every kind of urethral contraction. Other conclusions resulting from the doctrines of the learned professor, are, 1st, that those contractions described by all authors, and consisting of a more or less complete valve, or of bridles, or other alterations, cannot have any real existence; 2d, that those barbarous methods of treatment, borrowed, apparently, from the ancients, and predicated on the late mistaken notions concerning this disease, are henceforward to be rejected from surgical practice; and 3d, that all those complicated and dangerous instruments invented upon such misconceptions, must, as a matter of course, be also proscribed.

M. J. Béniqué, in a recent work, (*Reflex. et Observ. sur le traitement des rétrécissements de l'Urèdre*, Paris, 1844,) also gives the preference in these affections, to *dilatation* over every other process. His method appears to be reasonable, and to be full as effectual as the usual modes, and attended with much less pain. He introduces bougies of several sizes rapidly in succession, from small to large, and leaves them in but a few minutes, and thus repeats the operation

daily, beginning each day with the largest bougie which had been applied the day before. M. L. Gosselin, (*Arch. Gén. de Méd.*, Paris, Fevrier, 1845, pp. 175—189,) however, revives the doctrine of actual *spasmodic contractions of the urethra*, as forming a frequent impediment to the sound and catheter. He maintains that there are *distinct circular muscular fibres* surrounding the membranous portion, and having a distinct aponeurotic investment, which, with the fibres, are totally different from and disconnected with the *levator ani* muscle. He expresses his surprise, that they have been overlooked by the most distinguished investigators on these regions, including Wilson, Guthrie, Amussat, Leroy d'Etiolles, Mercier, &c. He imputes to them the same or greater power of direct constriction of this portion of the urethra, the only part of it in which such fibres exist, than is possessed by the bundle of muscular fibres described by M. Mercier, (*Ib. loc. cit.*,) to exist on the lower segment of the vesical extremity of the urethra. These last constitute there a sort of half sphincter, which, in cases of organic contraction in some part of the passage, is apt to become involved in inflammation and irritation to such degree as to contract with violence and form a valve, which momentarily closes up this orifice and prevents the escape of the urine until the effort of contraction passes, through fatigue, into relaxation. This then, says M. Gosselin, is also a true *spasmodic contraction*, but at the vesical termination of the urethra, and to be added therefore to the other locality where the contraction, embracing the entire contour of the passage, viz.: the membranous portion of the tube, may, according to M. Gosselin, also take place. The surgeon should be on his guard in respect to these nice and yet disputed points in anatomy while in the employment of catheterism; and on this subject we would also commend to his study a recent work of M. Mercier, entitled *Recherches sur la nature et le traitement d'une cause fréquente et peu connue de retention d'urine*, Paris, 1844. It is to be farther noted that M. Gosselin considers that facts do not yet authorize us to admit that perfect spasmodic contraction, that is, an entire spasmodic or temporary muscular constriction and closure of the urethra, can take place elsewhere than in the membranous portion designated, and also it does not occur there except in cases where there already exists an organic contraction or a blenorragia. T.]

#### ARTICLE IX.—POLYPI OF THE URETHRA.

The urethra of both sexes so often requires the aid of operative surgery, that this subject of itself could furnish matter for several volumes. I have a remark still to make on one of its diseases which are the least known.

##### § I.—In Woman.

In 1825 a midwife brought to me a lady about 20 years of age, who had had for some months a pyriform reddish tumor of slight consistence and of the size of a small nut, and which projected slightly to the outside by its dilated or rounded extremity, and was fixed by its root at the depth of four lines in the urethra. I seized

this polypus with an erigene, drew it a little towards me, and immediately excised it without causing the slightest pain. On the following day the patient found herself cured. In 1829 I met with a case precisely similar. A woman, whom M. de Blainville had sent to me in 1832, furnished a third case of this character. I have seen others in patients of M. Bonis, M. Yvan, M. Demazière and M. Comet, and also in four or five other patients who were at La Charité, (Barthez, *Journ. Hebdom.*, 1836, t. II., p. 310.) M. Wardrop (*The Lancet*, 1828, vol. I., p. 585) has seen three cases of this description. These vegetations in women moreover have been mentioned by Vogel, Rosenmuller, Chaussier, and MM. Lachapelle, Kaldebrand, Prochaska and M. Larcher, and everything leads us to believe that excision and cauterization, which I have always succeeded with, is their true remedy.

## § II.

*Man* appears to be equally liable to this species of polypi. I have met with two instances of them. In one the excrescences, which were three in number, were scarcely as large as barley seeds. In the second patient, who was a young Englishman, whom M. Beaumont asked me to see, there was also a number of them and they were still smaller. They were also situated behind the meatus urinarius. None of them re-appeared after having been broken up or excised. Do not the polypi which Nicod has spoken of so much, belong to this species of production? M. Amussat, (*Rev. Méd.*, 1835, t. IV., p. 428,) has found them as far in as at the membranous portion of the urethra. The small tumor that M. Thiaudière, (*Bull. de Théráp.*, t. VII., p. 240,) took for a pea-shaped cancer, and which was situated at the bottom of the fossa navicularis, and repullulated after having been excised by means of an incision upon the dorsal surface of the glans penis, and which disappeared after a second excision followed by cauterization, was according to all appearance nothing more than a polypus of this kind. The simple tearing it out and cauterization would have succeeded full as well as the complicated operation of M. Thiaudière.

[*Polypi of the Urethra.*—It is very clear that this subdivision of the nomenclature of polypi, can be deemed little else than the offspring of that *penchant* for refinement and innovation, which is caused at the present day by the great abundance of collaborators in the field of anatomical and surgical inquiry. It is certain that we have no very authentic evidence as yet, that *polypi*, properly so called, ever do form in the urethra. Though it has been asserted that they frequently do in women, as by MM. H. Bavoux, (*Arch. Gén. de Méd.*, Sept., 1845, 4e ser., t. IX, p. 101,) Asson, (*Ib.*, Oct., 1845, p. 235,) S. Medoro, (*Ib.*, p. 236, and *Giornale dei Progressi*, Dec., 1844,) and Camin, (*Ib.*, loc. cit.) it is evident that the cases in question by these authors, were for the most part nothing more than venereal *vegetations*, so common in the vagina, on the glans penis, prepuce, lips of the meatus, &c. T.]

**ARTICLE X.—ABNORMAL DILATATION OF THE URETHRA.**

In a patient affected with incontinence of urine, and in whom the urethra presented a considerable degree of dilatation, M. Hobart, (*Rev. Méd.*, 1830, t. IV., p. 285,) partially excised its lower wall, then re-united the wound by means of a suture, and in this manner succeeded in re-establishing the vesico-urethral functions. A woman had her urethra so enlarged, that she could no longer retain her urine. M. Gensoul, (*Perouse, Thèse*, No. 276, Paris, 1834—*Arch. Gén. de Méd.*, 2e ser., t. VIII., p. 121,) by excising a flap from its lower wall and reuniting the sides of the wound by means of the twisted suture, also succeeded in restoring this canal to its natural dimensions.

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**CHAPTER III.****PUNCTURE OF THE BLADDER.**

The necessity of making a solution of continuity in the bladder, in order to give egress to the urine, is at the present day so rare an occurrence, that M. Roux, M. Mott, and a number of other surgeons of very great experience, have never met with it. Since the diseases of the urethra and the prostate have become better known, retention of urine in fact is a very rare occurrence, and when it does take place, the accurate anatomical knowledge which the greater part of surgeons of our day possess, enable us almost always to relieve it by means of bougies or simple catheterism. It may, nevertheless, happen that every other attempt has failed, and that we are compelled to choose between forced catheterism and puncture, that is, between two operations which are almost alike dangerous, but the first of which cannot be performed by everybody. There are three modes of performing the second, namely, by the perineum, rectum, or hypogastrium.

**ARTICLE I.—PERINEAL PUNCTURE.**

The opening of the bladder through the perineum, in order to remedy ischuria, must have appeared a very simple matter to the ancient lithotomists, who admitted no other passage for the extraction of calculi. So also was it the first route which was proposed, and the only one which was for a long time followed. Latta, to whom Sœmmering ascribes the honor of this process, is no more the inventor of perineal puncture than Garengeot is, who appropriated it to himself a half a century before. Riolan and Thevenin formally recommend it, and Tollet had already performed it in 1681. Dionis also describes it quite at length, and shows that it may be performed in two modes. An incision an inch long upon the raphé, in the same manner as for the great operation, would enable us to plunge a long bistoury into the bladder in front of the anus; to

introduce a sound here while withdrawing the cutting instrument, and to leave a canula in the wound for the evacuation of the urine. But Dionis thinks it would be better, in order to protect the prostate, to prolong the incision a little to the outside, as in lithotomy by the method of F. Jacques.

Juncker, Lapeyronie and Heister, suggested almost at the same epoch the idea of substituting a long trochar for the bistoury, and they considered that they had in this manner rendered the operation much more simple. In this respect it is reduced to the first stage of the process for lateral lithotomy by Foubert, and it is performed in the same manner, that is to say, having placed the patient in the same way as for lithotomy, we plunge the instrument in at the middle of the space which separates the ischium from the raphé, directing it a little inwards and forwards in order to fall almost perpendicularly upon the side of the neck of the bladder. The fear of making a false route through so many different tissues, had given rise to the suggestion that we should incise the perineum by means of a bistoury, and not employ the trochar until after having felt with the finger the distended bladder at the bottom of the wound. This is a modification which Sabatier recommends that we should apply to perineal paracentesis, as Garengeot had recommended it for lateral lithotomy, and the result of which would be that we should fuse into one process, the methods of Dionis and of Juncker. But this advice has generally been neglected. While the French writers continued to recommend pure and simple puncture, incision did not cease to be adopted in England, where it appears to have been performed in various ways. M. A. Cooper, following in the footsteps of Dionis, incises a little to the left of the raphé, depresses the bulb and then the prostate to the right by means of his left forefinger, while with a very sharp scalpel in the other hand he divides the tissues and penetrates into the bladder. M. Chas. Bell, when he thinks he can find the urethra behind the contraction, lays open this canal as in Cheselden's process of lithotomy, and alleges that in this manner we arrive into the bladder with less danger. M. Brander recommends that we should not penetrate except by incising layer by layer; but Jones and Dorsey do not see the utility of so many precautions. To recapitulate, if puncture with the trochar is more prompt, it is at the same time less sure. If the instrument has less danger for the vessels and the ureters or vesiculae seminales, and that it would rather separate than divide them, it escapes with greater facility also between the organic layers, and may more easily miss the bladder. In using a long and narrow bistoury we afterwards have to introduce a sound into the bladder, and then a canula. The false routes, though less probable, are nevertheless possible, and the danger of wounding the organs, which ought to be avoided, is much more to be apprehended. Incision, properly so called, which is more rational and more prudent, is also more difficult. The want of a conductor, which it is out of our power to pass through the natural passages, renders this process more delicate and more uncertain than in lithotomy, whether we desire to respect the prostate, as in the lateral method, or whether we penetrate through the urethra. Nevertheless, as in such cases the bladder is very much distended, and its excretory duct almost

constantly enlarged behind the coarctation, I would, if I were ever under the necessity of opening an artificial passage for the urine, limit myself to finding the urethra and making a slit between the contraction and the anus, even though I had to include the apex of the prostate in my incision. This opening would possess the double advantage of offering not only a passage for the sound and canulas that we might wish to introduce into the bladder, but also of enabling us to pay immediate attention to the diseased canal from behind forwards. The button-hole incision of which I speak, while it is neither more nor less dangerous than the ordinary incision for lithotomy, is certainly less so than the other modes of puncturing the bladder, which, it is calculated, if I am not deceived, to be successfully substituted for, in all those cases in which the morbid or abnormal state of the perineum does not present any obstacle to our cutting down upon the urinary passage through this region.

## ARTICLE II.—PUNCTURE THROUGH THE RECTUM

The fluctuating projection which the bladder forms below the rectum, when it is distended by the urine, is of itself sufficient to suggest the idea of recto-vesical puncture. It is even surprising that it was not sooner thought of, for the finger introduced into the anus must have frequently felt this fluctuation. Fleurant, who considers himself to have been the author of this operation, and Pouteau, his successor, with a view of retaining the canula of the trochar in the organ, in order not to be obliged to recommence, if the natural passage should be too tardy in becoming re-established, bent the opening of the canula of their curved trochar, to a right angle on the concave side of its tube. By this means it is found reversed as it were, upon the perineal groove, in front of the anus, where it is easy to fasten it in such manner that it will not interfere with the stools, nor prevent the patient from walking or sitting. Most of those authors who recommend leaving a canula in the wound, have adopted the instrument of the surgeon of Lyon. Those who, like Hamilton, consider that it is better to withdraw it immediately, at the risk of being obliged to repeat the puncture, require nothing more than an ordinary curved trochar. It is a matter of little importance, moreover, whether its point is flattened into the form of a lancet, like that of B. Bell, or triangular, like the one which M. Howship has endeavored to bring into repute among his countrymen. A narrow bistoury, protected with linen, would effect the same object and would expose less, perhaps, to the risk of fistulas, and would penetrate better; but it is not so easy to manage, and is less commodious for the placing of a canula. The patient, who is placed in the same position as for lithotomy, might, if necessary, rest with his belly upon the edge of a bed, with his legs hanging down, did not such a posture add too much to his sufferings. The operator in that case would have no necessity for assistants, and would find himself more at ease for perforating the bas fond of the bladder perpendicularly. In both cases the forefinger alone, or the fore and middle finger of the left hand, besmeared with cerate, or any greasy substance whatever, and introduced into the rectum, recognize the projection of the

bladder and the prostate, stretch the parts, by separating them a little from each other, and are fixed with their palmar surface turned forwards, at a little distance from the gland, while the pulp or the nail rests against the distended organ, after which they serve as a gorget, or conductor to the trochar. This last introduced with the right hand, and with its concavity forward, upon the intestinal side of the trigonus, between the peritoneal cul de sac and the base of the prostate, is suddenly plunged in, as if it were with the intention of pushing it to the umbilicus, that is to say, obliquely upwards and forwards. When it has passed through the tissues, and its point has entered into the bladder, its lateral groove allows some drops of urine to escape, and gives us the assurance that we have not made a false route. The stilette is withdrawn ; the liquid runs out, and the bladder being once emptied, the operation is terminated, unless we decide upon fixing a tube in the wound. In this last case, a flexible catheter, which is very pliant, and which should be protected by lint in order by means of some compresses, and a T bandage, to keep it immovable upon the perineum, ought to have the preference to the canula of the trochar, which latter, however, could serve as a director to introduce it. But it is doubtful if a derivative tube would then be necessary. In the patient of Hamilton the wound reopened of itself. In the contrary case a second puncture would probably involve fewer inconveniences than the protracted presence of a foreign body in the rectum and bladder. Rigidly considered, it would be at least useless to leave the canula beyond the time necessary for the cohesion of the tissues, that is to say, beyond the space of 12 to 24 hours ; for the inflammation which takes place in the little wound does not after that permit the urine to become infiltrated into the tissue of the recto-vesical septum, while at the same time it opposes no serious obstacle to its escape.

### ARTICLE III.—HYPOGASTRIC PUNCTURE.

The principles advanced on this subject in the last century by Hoin and Noel, prove that puncture above the pubes, which must have originated at the same time with hypogastric lithotomy, had not yet found but a very small number of partisans. Tolet, Drouin, Turbier, Méry, Morand and a few others were, according to M. Belmas, the only persons who practised it. But the authority of F. Côme, Bonn and Paletta, and especially that of Sœmmering, who declared himself its unequivocal champion, ultimately brought it into vogue throughout all Europe, in spite of the efforts of Murray and Mursinna to bring into repute recto-vesical puncture. It was almost the only puncture employed in France for a long time. The case of puncture by the rectum found in the thesis of M. Duplat, and the two examples which M. Cabanellas has cited from the practice of M. Magnan, are exceptions which passed unnoticed. As the straight trochar which was first employed might wound, and as the point of its canula left remaining might ulcerate the posterior wall of the bladder, which necessarily contracts upon itself after the evacuation of the urine, the curved trochar of F. Côme has been generally adopted, whether we confine ourselves to puncture without previous incision, or in imitation of Abernethy, divide the hypogastric wall with the bistoury

before having recourse to the trochar. The operation, moreover, is so easy that the preparatory incision is in reality only calculated to embarrass it. The patient is to be placed horizontally on the long edge of his bed. The surgeon first looks for the upper border of the pubes and the median line ; he then directs the point of his trochar to a point about an inch above the symphysis and plunges it with a single movement from above downwards and from before backwards into the bladder, where he arrives after having passed through a space which varies according to the embonpoint of the patient and the particular arrangement of the parts. The stilette having been withdrawn, the urine escapes, and the canula, which is to be shut up with a peg, is afterwards fastened around the body by means of cords which are attached to the lateral parts of its pavillon. But this canula is still more dangerous above the pubis than in the rectum. If it is too long it ulcerates the organ ; and if too short, its point having been left by the bladder which contracts upon itself, becomes arrested in the surrounding cellular tissue. If it is not changed from time to time, it may become encrusted with calculous concretions, by which its removal will be attended with difficulty. After having withdrawn it, it is not always an easy matter to place it in again. As a gum-elastic sound introduced into the bladder through the metallic canula and left there in place of this last, is of a smaller diameter, it would not completely fill up the wound and would therefore allow the urine to filtrate between the tissues and the foreign body. The flexible sheath serving as a chemise to the instrument, and which M. J. Cloquet introduces at first, in such manner that in withdrawing the stilette, to allow the urine to escape, and afterwards its canula, it is found alone in the solution of continuity, is but an imperfect remedy for this difficulty. It has to be shorter than the silver tube, on the external surface of which its lower extremity always forms a projecting circle which is more or less irregular, whatever care we may take to attenuate and regularize it. From whence it is, that there exists a series of projections or borders, rendering it more difficult to push it through the tissues. Moreover it would be incorrect to suppose that a tube, whose circumference is exactly fitted to the contour of the opening through which it has passed, would for any length of time remain in this precise contact. After the expiration of a few hours this is already found to be no longer the case, and the fluids pass with facility between the canula and the wound. The bougies and sounds in the urethra daily afford evidence of this, a fact which I also again saw in the patient, who, in the year 1822, at the Hospital St. Louis, contrived the modification of which I have just spoken. Such considerations all go in support of the practice of those who do not consider it proper to leave any thing in the wound, and who, when circumstances make it necessary, prefer to repeat the puncture as soon as the bladder is again distended. I would be wholly of their opinion if the puncture of the abdominal walls, which agglutinates more rapidly than that of the bladder, did not expose to the risk of the filtration of a few drops of liquid into the pelvic cellular tissue, and if after the expiration of about twelve hours the inflamed state of the wound had not already transformed it into a sort of fistula. A patient in whom I had recourse to puncture twice in the space of three days,

died on the sixth of a peritonitis. A dark colored collection of small extent was found between the lower part of the hypogastrium and the front part of the bladder. A case of hypogastric puncture of the bladder, however, related by M. Franc, (*Extract des Calculs, &c.*, p. 5,) was not followed by any accident. This puncture, which was successfully performed in 1828, by M. Vaust, (*Mem. de l' Acad. Roy. de Méd.*, by M. Voltens, Dec., 1838,) was again repeated on the same patient, by M. Voltens, (*Ibid.*, Dec., 1838,) in 1834. The patient operated upon wears a gum-elastic catheter and experiences no inconvenience from it. He was afterwards operated upon at the perineum and his urethra appeared to have closed up. M. Nick, (*Gaz. Méd.* 1839, p. 185) relates the case of a man 72 years of age, in whom hypogastric puncture was performed to relieve an ischuria, and who was obliged to wear a canula up to the time of his death, which took place at the expiration of twelve years.

#### ARTICLE IV.—PARALLEL BETWEEN THE DIFFERENT KINDS OF PUNCTURES.

The three kinds of vesical paracentesis have each in turn been eulogized or proscribed to the exclusion of the others, and as usual in such cases, the accurate truth of the matter has almost always been infringed upon.

##### § I.

*Recto-vesical puncture*, without being as formidable as Sœmmering alleges it to be, is far from being as innocuous as Murray and Schmucker (*Rougmont, Bibl. Chir.*, p. 40,) consider it. Tumors in the neighborhood of the anus, and also the thickness of the septum at the entrance of the intestine, may render it painful, or its execution uncertain, or even impossible. The instrument may escape between the bladder and rectum into the pelvic cellular tissue, or it may perforate the peritoneum when this membrane descends too near the prostate or if we puncture a little too high, or if we go too far down or to the side, we may wound the vasa deferentia and the vesiculæ seminales, or even the ureters. As the organ is incised very near the urethra, and consequently near the seat of the disease, we incur the risk of aggravating the accidents in this respect. Finally, the wound may remain fistulous, and allow the stercoral humidi ties to enter into the bladder and produce fatal consequences. It is true that the greater part of these difficulties will in most cases be overcome by a skillful hand, and that the dangerous consequences which I have just mentioned are not all unavoidable; but the fistula, which the address and intelligence of the operator cannot prevent taking place, as is proved by the cases related by Bonn, Paletta, Angeli, &c., is alone of itself a very serious disease, and the cure of which is attended with too much difficulty to allow us to run the risk of its occurrence when it is possible for us to avoid it. In exchange for so many inconveniences, puncture through the intestine has the advantage of being generally easy, of penetrating the bladder at its most depending point, of traversing only a small extent of tissues, and such as are too condensed to lead to any serious apprehension

of the infiltration of urine or abscesses, which however have been sometimes seen to take place, especially in a patient mentioned by M. Nauche; the advantage also of giving facility to the use of a canula, in the manner recommended by Schmucker, (Rougemont, *Bibl. Chir.*, t. I., p. 40,) and of not absolutely confining the patient to his bed: a case of a man is related, who had undergone this operation twenty times without experiencing any accidents from it. (*Bull. de Fér.*, t. XII., p. 240.)

### § II.

*The supra-pubic puncture* is not applicable when the retention is caused by contusions or inflammation, or by tumors in the hypogastric region. It must expose more than any of the others to the risk of infiltrations and urinous abscesses. As the bladder is opened upon its anterior surface, it cannot empty itself without difficulty, and does not so well support the presence of a canula. Sometimes we are obliged to penetrate to a great depth to find the organ, and the peritoneum is not always safe from danger. There are however no fistulas to be apprehended, and even though the wound should take on this character, we should have no reason to be alarmed with it. As the peritoneum is crowded back and separated at a distance from the pubes by the force of the distended bladder itself, it may be easily avoided, and it is almost impossible to miss the bladder in plunging in the trochar. The operation, which is still more easy than by the rectum, is not more painful than paracentesis abdominis, and is performed upon a region which has not become altered, and which is therefore less irritated or less irritable than the diseased part.

### § III.

Puncture through *the perineum* is incomparably less certain than at the hypogastrium, and endangers the vesiculæ seminales and urethra in the same way as puncture at the rectum. It may strike too far forward and between the pubes and bladder, or too far backwards, and thus penetrate into the peritoneal cul de sac or into the intestine, and thus not arrive into the distended reservoir until after having lacerated their walls. Nor are the vessels of the peritoneum or the prostate safe from the instrument. Infiltrations and abscesses are not altogether impossible, and in no region is the presence of a canula more irritating. The only advantages of this puncture are, that it opens into the bladder upon a depending point, without exposing to the risk of fistulas as that by the rectum does; of making a readier passage for the urine, without incurring as much risk of urinary inflammations as puncture at the hypogastrium. Such advantages, though small in number, are important; and if we had not to purchase them at so dear a price, or if they were actually of any great value, perineal puncture ought perhaps to be preferred to the other two modes. Now it appears to me that a simple button-hole incision at the urethra possesses these advantages in a still higher degree, and that it even enables us, almost with a degree of certainty, to avoid all the neighboring organs. As it has no other inconve-

niences than that of being a little more delicate, and somewhat less prompt, I consider it preferable in all cases where the form or con-texture of the perineum is not too much changed from the normal state, and where the surgeon has some experience in operations. In the other cases supra-pubic puncture should have the preference, and recto-vesical puncture would be reserved for exceptional cases, and would not be had recourse to except in those instances in which some particular obstructions were interposed to the introduction of the instrument through the two principal passages.

#### § IV.

As to the method of penetrating from before backwards, *through the symphysis*, as M. Brander recommends, and states that he has practised, and as Meyer is said to have (*Rust's Handb. der Chir.*, vol. XIII., p. 85) advised in cases of retracted bladder, it is doubtless one which can find but very few partisans; in the first place, because in taking the adult age into consideration, it would in most cases be impossible; and in the second place, because it would not protect us with greater security from infiltrations than hypogastric puncture.

#### § V.

In the same way also that it would be *rash* to have recourse to puncture in the bladder without some very positive indications, as it would be, for example, in cases of retention caused by a mere spasm of the urethra, two cases of which are related by M. Racine, and in those alleged spasmoidic contractions which M. Holbroock still ventures to point out to the attention of practitioners; so also should we aggravate the danger of this operation if we waited too long. In a patient who has not urinated for the space of 24, 36, or 48 hours, the bladder having become distended to an extreme degree, may become eroded or even burst. The pain, fever, and escape of a portion of the urine into the general circulation, would, under such circumstances, soon place the patient in so alarming a situation that puncture could no longer save his life or prevent a number of accidents which would not probably have followed it a few days sooner. The case which fell under my own notice, and which I just cited, is another evidence of this.

### CHAPTER IV.

#### URINARY FISTULAS.

##### ARTICLE I.—RECTO-VESICAL FISTULAS.

*Recto-vesical fistulas*, which are equally as obstinate as those of the vesico-vaginal septum, are moreover treated precisely in the same manner and by the same processes. In these cases however

the surgeon begins, if the urethra is contracted, by restoring it to its natural dimensions; by depressing the prostate with the *redresseur* of MM. Tanchou, Leroy or Pravaz, should its size be such as to interfere with the passage of the urine; and by destroying, in fine, the obstructions that the bladder encounters in evacuating itself through the natural passage. Desault cured recto-vesical fistulas, following the operation of lithotomy by incising the parts situated between the wound of the perineum and that of the intestine, comprising in this incision the sphincter of the anus, in such manner as to transform the whole into one single wound. But if the first incision had been cicatrized for a long time, this process would be no longer applicable or would at least require some modification. In such cases we might imitate with advantage the conduct of M. A. Cooper, who again laid open through the perineum, upon a grooved sound the prostatic portion of the urethra from before backwards, in order that the urine, finding a means of escape anteriorly, might allow the posterior opening to close up, in which operation he succeeded perfectly in one instance. The incision with the bistoury, extended from the fistula to the perineum and on the groove of a sound, as in rectoprostatic lithotomy, would be more easy and more certain perhaps than the oblique operation of Desault, should the process of M. Cooper not appear to be sufficient, but it would expose to the risk of wounding the verumontanum and the ejaculating ducts. In a youth 14 years of age, a rod of iron, which had penetrated through the anus, laid open the bladder to a great extent. Two years after, M. MacFarlane, consulted by this patient, (*Arch. Gén. de Méd.*, 2e sér., t. II., p. 281,) had recourse to cauterization, and effected a cure in the space of two months. The same surgeon mentions a child of 12 years, whose bladder had been wounded by the thrust of a bull's horn, and who was not over six weeks in getting cured of his fistula.

#### ARTICLE II.—INTERNAL FISTULAS.

*Fistulas of the kidney*, or *ureter*, or on the apex or sides of the bladder, and which do not open externally, but discharge into the intestines beyond the reach of instruments, can expect no relief from surgery, except in so far as they should depend upon an obstruction, calculus, or coarctation, for example, which might be removed or destroyed. *Fistulas of the umbilicus*, from the urachus continuing open, are cases of this kind.

#### ARTICLE III.—FISTULAS OF THE URETHRA.

It is not altogether the same with fistulas of the *urethra*, as it is with the fistulas in the preceding cases. In the corpus spongiosum they rarely fail to disappear spontaneously as soon as we have adopted the precaution of re-establishing the dimensions of this canal. At the fossa navicularis, where M. Barthélemy, (*Bull. de Fér.*, t. XIX., p. 74,) has seen them open in the manner of the spout of a watering pot, they may almost always be dried up by not permitting the patient to urinate for some days except by means of a catheter, as was done by this surgeon, in adopting also the precaution to

place the finger behind the glans penis, in order to keep the canal accurately applied against the instrument, every time that the bladder was emptied. I have, however, failed with this process in two cases of exceedingly small fistulas which were situated, one on a line with the fossa navicularis, and the other at a few lines behind. Fistulas from defect of original conformation may also exist in this place. In a subject for dissection, M. Labat, (*Gaz. des Hôpits.*, 1839, p. 135,) found that the ejaculating ducts, after having passed through the prostate, united together above the urethra, so as to form a single canal which afterwards ran through the whole length of the penis, and then opened externally above the meatus urinarius.

### § I.—*Injections.—Cauterization.*

The fistulas in the bulbous, membranous and prostatic portions, which are the most frequent and the most obstinate, are therefore, so to speak, the only ones which require a special examination. Whether they have one or several external openings, or whether they are sinuous or direct, or go to terminate far from their point of departure, either near the scrotum or in the groin, at the breech, or in the anus, or on the inner side of the thighs, or at the extremity of the labia majora in women, or at the perineum, the first and frequently the only thing to be done is, to explore the urethra and to destroy the coarctations, should any be met with. If they persist after this preliminary treatment, we must have recourse to injections that are made irritating by means of alcohol, vinegar, or dilute mineral acids, or to cauterization, by means of nitrate of silver, or crayons of mignon, or with nitrate of mercury, or to compression, in a word to all the various medications proposed against fistulas in general, and which enter into the domain of surgical pathology, properly so called. If they still resist and are sinuous, we excise them in order to lay bare their bottom; after which there are no other remedies by which to effect their cure than derivative catheterism, together with additional cauterization and the suture. Some yield to no remedy, but ultimately in the course of time get well of themselves. A physician who had exhausted all the resources that had been recommended to him by Boyer, Dubois, Dupuytren, and MM. Richerand. Roux, Marjolin, Cloquet and myself, presented a remarkable example of this kind.

### § II.

*Derivative catheterism* can scarcely succeed except in those fistulas which are unattended with, or have but a very slight loss of substance, whether they have or have not been preceded by contraction of the urethra. The gum-elastic catheter left to remain in, is not always unattended with inconvenience, which may be said also of the metallic S shaped catheter, which was used by J. L. Petit, the one with a fixed curvature as recommended by Hey, or that which is strongly curved as Physick advises when the prostate is engorged, as also of that which has a free direction, like the one generally employed in France since the time of Desault. If it remains open in order that the urine may escape in proportion as the ureters deposit

it in the bladder, its point presses against the posterior wall of this organ, and irritates, and ulcerates, and sometimes even perforates it. If it is kept shut up, a small quantity of the urinary fluid, which almost constantly makes its escape between it and the walls of the canal, will be found sufficient in many cases to prevent the fistula from becoming obliterated. This is a fact which has been perfectly well demonstrated by Asselin in his Thesis in 1803, and which is confirmed by the experience of M. Caffort. It is, consequently, better to catheterize the patient, or for him to learn to do it himself, with a silver catheter in preference, as often as he is under the necessity of urinating. A patient whom I had in vain submitted to the use of permanent catheters, at La Pitié in 1830, was radically cured at the expiration of three days, as soon as I decided upon catheterizing him every four or six hours, and then immediately removing the instrument. Cauterization may be combined with catheterism, and becomes indispensable as soon as the cure is delayed beyond a week or two. If after six weeks or two months the disease continues, we may, without fear of being charged with precipitation, have recourse to the final expedients.

### § III.

The button-hole incision, which in a case of necessity might be applied to urinary fistulas of the penis and scrotum, is an operation which is eulogized by M. Viguerie, (*Journ. Hebdom.*, 1834, t. I., p. 183,) but which has, however, nothing very conclusive in its favor. To incise the urethra at the perineum, in order to cure openings which exist in front of it, has undoubtedly something very plausible in it; but besides that it is not always an easy matter, the cases of M. Viguerie himself prove that we thereby establish a new fistula in the patient, and one which we cannot get rid of at pleasure.

### § IV.

*The suture* is applied here in the same way as in any other region. We commence by transforming the fistula into a button-hole incision, or one which is somewhat elongated, but less so on the wall of the urethra than at the integuments. After having abraded its borders, removed the callosities, and approximated the two lips upon a flexible catheter, which is destined to remain in place, we keep them in contact by means of a sufficient number of points of twisted suture, which points should not be more than three lines apart, if we do not wish the urine to infiltrate between them, and which, for the same reason, ought to be tightened sufficiently if we wish the agglutination to take place wholly by first intention. We afterwards fill up the perineal depression with compresses or lint, in order to support the whole by a gentle compression. If everything goes on well, we remove the needles on the fourth or fifth day, beginning with those at the angles. The other is left in a day or two longer. This, in its turn, is removed, and the patient will be found to be cured. M. Cloquet has been successful in one case of this kind, (*Journ. Hebdom.*, t. IV., p. 45.) Unfortunately we have not always as happy a re-

sult, as is proved by the fruitless essays of Chas. Bell. It frequently becomes necessary to repeat the operation several times; also it is not unusual to find that all the efforts of the surgeon, and all the perseverance of the patient, result in nothing more than an enlargement of the fistula. I have elsewhere mentioned what urethroplasty (see Vol. I.) in vain attempted, by M. Green, (*The Lancet*, vol. II., p. 669), has obtained, up to the present time in the hands of MM. A. Cooper, Earle, Alliot, &c. M. Dieffenbach, (*Rev. Méd.*, 1826, t. IV., p. 123—*Arch. Gén. de Méd.*, 1836 1837,) after making trial of cauterization by itself, suture after cauterization, abrasion and interrupted suture, abrasion and twisted suture, suture of a fold of the skin, the borders of which were united over the fistula, and also of circular strangulation of the contour of the ulcer, has, by submitting the fistula at last to a final test with the suture, anaplasty and cauterization under all their forms, succeeded in some instances; but he has also seen a great number of urethral fistulas, and even such as were of the smallest kind, that have obstinately resisted all his efforts, and persisted in continuing in spite of every remedy.

#### ARTICLE IV.—HYPOSPADIAS.

Urethral fistulas from birth, somewhat near the glans penis, require no other remedy than the creation of a new canal in the tissues of the penis, by which process M. Rublach (*Bull. de Fér.*, t. X., p. 159,) states that he succeeded in one instance. In a case of a very large fistula, which formed under the glans penis, in consequence of an ulcer, M. Heller (*Gaz. Méd.*, 1834, p. 747,) divided the bridle and abraded the sides of the incision, then inserted seven points of suture, and thus completely succeeded. M. Perrin, (*Arch. Gén. de Méd.*, April, 1839, p. 485,) in order to cure a hypospadias, caused by an ancient stricture of the urethra, confined himself to the excision of the prepuce and pendant portion of the glans. A child 8 years of age, who had brought on a hypospadias by constricting his penis, was cured of it by M. Pauli, (*Gaz. Méd.*, 1838, p. 807,) by means of excision of the prepuce, and by detaching the integuments of the penis, and then inserting six points of suture. As to hypospadias, properly so called, I am not aware that it has been often treated by an operation. The abrading of the sides of the furrow which prolongs it in front, then detaching them a little, in order to bring them to the median line, and afterwards uniting them by suture upon a catheter, which is to be left in the urethra, would enable us, perhaps, to effect a cure in some instances; but I doubt if the hollowing out of a new canal through the glans penis, either from before backwards or from behind forwards, would present much prospect of success. Moreover, we should not be justified in attempting such operations, except only at the period of puberty or in adult age. M. Bégin, however, (*Elem. de Chir.*, 2d edit., t. I., p. 565,) like M. Rublach, had recourse to it in a child who urinated only through a capillary aperture, situated at a finger's breadth behind the fossa navicularis. A probe having been introduced into the passage, and directed towards the glans, a hydrocele trochar was applied to the point where the meatus ought to have existed, and plunged in

until it came in contact with the probe. The canula was left in, and on the day after a gum-elastic conductor of Ducamp was substituted in the place of this. The fistula, after being cauterized, cicatrized, and the cure was the result. Might we not, says the same author, (*Ibid.*, p. 563,) apply to *hypospadias* the following process: abrade the borders of the gutter of the penis, by detaching the skin on each side; and then reconstruct for the canal a lower cutaneous wall, either by means of elongating the skin, and uniting it upon a catheter, or by taking a flap borrowed from the neighboring parts, and brought down upon the penis? This suggestion has not been tested in practice.

[*Cure of Hypospadias.*—It was M. Ricord who invented the ingenious process for the cure of a hypospadias, or destruction of the lower wall of the urethra, to the distance of three centimeters from the meatus, and which interfered with erection. He made a small incision into the membranous portion and passed the urine off by means of a catheter through this artificial route, until by abrading the lips of the defective portion of the passage and uniting them by suture, he had effected their agglutination. The case (*Arch. Gén.*, 3e sér., t. XI., 1841, p. 109,) completely succeeded, and the incision into the membranous portion soon healed up. The erections afterwards took place without difficulty. The dangerous point in this process is that of closing up the new or temporary aperture, and also the risk of urinous infiltration, as well as the exposure to a greater number of accidents from having two wounds under treatment in the same organ.

*Foreign bodies in the bladder and urethra.*—Modern surgery in its minute researches has added one remarkable fact to the chapter on foreign bodies in organic cavities,—or at least a fact which, had it ever occurred before, has hitherto escaped observation. Dr. Artaud, (sitting of the Acad. Roy. of Medicine, Paris, Jan. 27, 1845, *Arch. Gén.*, Fev., 1846, pp. 213–216,) on ascertaining, at Cherbourg, in May, 1840, from a female unmarried patient aged twenty-six, troubled with amenorrhea, and burning pricking sensation in the kidneys and urinary passages, with numbness along the right crural nerve, ischuria, &c., that she had passed a worm (strongle géant) with her urine, catheterized her and after withdrawing a large quantity of lactescent whitish urine, found the retention of urine, on the following morning, complete. On catheterizing again he perceived a foreign body, and substituting Hunter's forceps, cautiously extracted a reddish colored flattened worm, (twenty-two centimeters long and four millimeters thick.) Near a year afterwards on the recurrence of similar accidents, he extracted in the same manner a fleshy body of the size of an almond, and during the ensuing eight months, fifteen of these bodies of various size, and also seven more strongle worms. Finally, by aid of dilatation, he seized and brought out another fleshy body of the size of a large chesnut, pierced in its centre and containing five smaller bodies in its cavity. Syncopes, hysteria and hematuria, with some pain in the right lung and hemoptysis, succeeded, with intense fever and delirium. About eight months after the suppressed catamenia were imperfectly restored, when a *false membrane* thirty centimeters long, forming a

*cylindrical tube*, (*conduit cylindrique*,) large enough to admit the finger, came out *spontaneously from the urethra*. She now enjoyed good health for several months, until in the latter part of 1841, when the symptoms again returned, and she again passed three strongles. She was, however, still living January 27, 1845. (*Ib.*)

M. Ségalas, in his report to the Academy, as one of the commission on this case and its specimens, confesses, while admitting the facts as incontestable proof of the generation of *strongles géants* in the urinary organs, their inability to explain the *fleshy bodies*, (*masses charnues*,) whether they were the residuary of organized fibrine from hemorrhagic deposits, or *portions of the substance of the nearest neighboring muscles*, detached by the verminous affection. In reference to the last branch of this question, M. Ségalas alludes to the case of three worms, two to seven inches long, found imbedded (*lardés*) in the substance of the lumbar muscles, also to a strongle géant found by M. Blainville in the kidney of a weasel, (*marte*,) and which was over twenty-nine inches long and two and a half lines broad, and only half a line in thickness.

The *suppression of the catamenia* appears, in our judgment, to furnish a satisfactory explanation to most if not all of the phenomena. The discharge of *regularly organized false membranes*, during the violent, sharp, bearing down pains of the paroxysms of dysmenorrhea, which recur just anterior to the menstrual period, is no uncommon event in unmarried young women in whom the catamenial function continues to be but imperfectly performed. In one remarkable case I attended, of a married colored female, in the Bahama Islands, and in whom this affection had existed for years, the bearing down pains were excessively acute, and more so even than those of severe labor, from which in fact they were scarcely distinguishable. Enemata of laudanum, injections of the same into the vagina, and large doses internally, with the hot bath, &c., scarcely procured any relief. Little or no menstrual blood would come away at these periods, and in the intervals there was more or less of the usual substitute, fluor albus. But the great effort of nature to make up for the deficit, and in this case an anxious desire also to become impregnated, explain perhaps how the violent contractions of the womb aided in separating the fibrine from the other portions of the blood contained in the vessels on the inner surface of this cavity, and in thus forming the abnormal membrane. The case of Dr. Artaud in question, exhibited this same *abnormal organized membranous formation*, in fact a *tubular* one corresponding naturally to the cylindrical shape of the urethra, as the same *finger of glove-like tubes* of membrane are seen in croup, dysentery, &c. (See also our note on this subject in Vol. II. of this work.) The same diseased action which made the urethral cylinder, may very readily explain the fleshy fibrinous deposits expelled or extracted from the bladder. And were in fact the supposed *strongles géants* anything more than one of the *urinary cylinders* as it were consolidated? Therefore *not worms*, but all morbid products of the same altered condition of the blood, (i. e., highly surcharged with fibrine and gelatine,) from the suppressed and retained catamenial blood, however true it may be that the con-

dition of this latter recrementitious and quasi venous fluid in its normal state is such that it does not coagulate *out of the body*.

Three inches of a gum-elastic sound, which had broken off and slipped into the bladder in a man aged 50, December, 1836, (Dr. Buchanan, in *London Lancet*, July, 1840,) after occasioning much irritation and purulent discharges from the bladder and urethra, for the space of over a year, finally made its way in three successive portions at the meatus, from whence they were extracted by means of the forceps and probe.

In the case of a young man aged 25, who while playing with a metallic tube which he had introduced into the urethra, let it slip into the bladder, together with the pen within the tube, M. Dieffenbach (Caspar's *Wochenschrift*, 1843, No. 1) was obliged to make a small puncture above the pubis before he could extract it. We cannot however conceive why this surgeon should have first found it necessary before making the puncture, to resort to the lithotritic forceps passed through the urethra, in order to hold the tube in a fixed position. This part of the manipulation appears to us to have been quite unnecessary, as one end of the tube probably could have been so secured by two fingers in the rectum, as to make the other project above the pubis, and thereby designate the point to cut down upon with the bistoury. The more important was it not to make any uncalled for irritation in the bladder itself, from the admission by M. Dieffenbach himself; that he preferred a simple supra-pubic puncture with the bistoury to the operation of lithotomy at the perineum or rectum, because, as he says, of the greater danger of this operation in cases of foreign bodies that have been introduced into the bladder.

M. Leroy d'Etiolles, by means of lithotritic instruments, succeeded in breaking and extracting from the bladder of a woman (*Arch. Gén.*, Aout, 1844, p. 522) a round piece of wood, 93 millimetres long and 10 to 11 mill. in diameter. It occupied a transverse position. [T.]

## PART NINTH.

### DISEASES OF THE RECTUM.

#### CHAPTER I.

##### DEFECTS OF CONFORMATION.

###### ARTICLE I.—IMPERFORATION.

We sometimes find in young girls that the rectum opens into the vagina, or near the posterior part of the vulva, instead of terminating with an *anal* opening in front of the coccyx. Still more frequently we find in new-born children of both sexes, that the intestine ends in a cul de sac above its natural termination, and at a greater or less height in the pelvis. The first case, which belongs to the varieties of

artificial anus, is, all other things being considered, not so necessarily fatal as the second. The meconium extravasated into the bladder becomes diffused there and may be expelled from it during the course of a few days. An infant whom I saw, and who evacuated it by the urethra, lived for the space of several weeks. The opening, however, from the depot of faecal matter, and the canal by which it is excreted, are not in such cases sufficiently large for life to be sustained when the matters have attained a certain degree of consistency, and so much the more so because the urinary organs are not capable of supporting for a long time and without danger the immediate contact of stercoral substances. I have seen the anus in three instances open into the urethra, and in two into the bladder. M. Bonet, (*Revue Méd.*, 1829, t. II., p. 398,) M. Willaume, (*Journ. des Prog.*, t. VIII., p. 238,) M. Randolph, (*Encycl. des Sc. Méd.*, 1839, p. 195,) and Bravais (*Soc. de Santé de Lyon*, t. II., p. 97,) have also met with cases where its orifice terminated in the excretory duct of the urine. In patients mentioned by M. Fristo, (communicated by the author, 1838,) it opened in the loins in one case, and upon the dorsum of the penis in another. M. Palmer mentions a case of imperforate rectum where the intestine terminated on a line with the sacro-vertebral angle, after having made several zigzag turns, being the case of a female infant who lived four days, and in whom the operation for imperforate anus was performed without success. In another infant the rectum terminated in a cul de sac, and by a filament at the upper part of the sacro-vertebral angle, (Lieutaud, *Bull. de la Soc. Anat.*, May, 1839, p. 86.) In the case of M. Olinet, (*Journ. Univ. des Sci. Méd.*, Feb. 1820,) the anus was prolonged by means of a canal to as far as within two lines of the vulva, where it opened. In the case of Littre, its exit was at the hypogastrium; in those of Méry and Hartmann, at the umbilicus; in those of Schurig, Bonne, Desgranges and M. Dieffenbach, it was at a point on the vagina; in the two cases quoted by M. Champion and M. Ribes from Cnæffelius, La Faye and M. Lacoste, it perforated through the sacrum; in the case of M. De la Salle, at the membranous portion of the urethra; and in that of Desault and a number of others, in the bladder. The cases of artificial anus perforating the sacrum have, moreover, been met with in several instances, whether, as in the cases of Cnæffelius (*Eph. contre nature*, Dec. I, an. 4, 5, Obs. 65, 1773-4) and M. Fristo, there was no accompanying opening at the natural place, or whether, as in the patients of La Faye, (*Princ. de Chir.. &c.*) M. Lacoste, (*Bull. de la Soc. Méd. d'Emul.*, Oct. 1822, p. 417) and M. Ricord, (*Rev. Méd.*, 1834, t. III., p. 473,) there was only a simple hernia of the rectum, which had or had not ulcerated through the sacrum. The recto-vaginal, recto-vulvar, and all other kinds of external anus from defect of conformation, are disgusting infirmitiess, but do not necessarily cause death. On the contrary, the infant dies by necessity in a short space of time when the intestine is entirely deprived of an exit, or when it opens into an organ which does not communicate with the exterior. In both cases art has but two kinds of remedies to make trial of: 1. To re-establish the anus in its natural position; and 2. To make an artificial one on some other point of the abdominal cavity.

§ I.—*To re-establish the Natural Anus.*

A. *When the anus is closed only by the skin*, or by a layer which does not however possess but a few lines of thickness, its restoration is never a very difficult operation. A projection and a bluish spot generally point out its seat, and the obscure fluctuation which is sometimes perceived there by the finger enables us to act without any apprehension. In place of circumscribing it by a circular incision, as recommended by Levret, the surgeon should plunge the point of a straight bistoury or trochar into the centre of the spot, in the direction of the rectum, and down to the seat of the meconium. Having enlarged the puncture in the antero-posterior direction and transversely, he excises the four flaps; he then places in it a tent of lint or linen, or in fine, a suppository, in order to prevent it from closing up again, and afterwards continues to dress it in this manner with dilating bodies until it has perfectly cicatrized. A certain number of cures have been obtained in this manner, and are such as would justify no delay under such circumstances.

B. We should also act in this manner in those cases where, though the anus may exist, the intestine has been closed up by a septum at some distance above. Only that it would be advisable in such cases to surround the bistoury with a linen bandage, unless we should prefer the trochar recommended by J. L. Petit, or the pharyngotome, advised by M. Martin. In cases of this kind the excision of the angles of the crucial opening is no longer possible. The operation for this deformity was successful in the case of Pistor in 1764, as it had been before, and as it has since been in the hands of Moncelot, Loyseau, Demarque, Underwood, and M. Ouvrard. The instances of cure related by MM. Phélys, (*Bull. de la Fac. de Méd.*, 4th year, p. 102,) Laracine, (*Bull. de la Soc. Méd. d'Emul.*, 1824,) Sandras, Duparcque, Forget, (*Rev. Méd.*, 1835, t. II., p. 284,) Jodin, (*Journ. Hebd. Univ.*, t. III., p. 413,) Salmon, (*Gaz. Méd.*, 1838, p. 456,) and Bouyer, (*Bull. de l'Acad. Roy. de Méd.*, t. II., p. 818,) also probably belong to this class. The infant, however, that was operated upon by M. Goyrand, (*Journ. Hebd.*, 1834, t. III., p. 245,) died in consequence at the expiration of twelve days. MM. Wolff, and C. Hutchinson, (S. Cooper, p. 209—S. Cooper, *Dict.*, p. 208,) have both succeeded once in new-born infants, who had an imperforate anus of this description. The deformity in one of them was not noticed until the 12th day. In a case of similar anus, M. Miller, (S. Cooper, *Dict.*, p. 210, edit. 1838,) was obliged to repeat the operation eleven times before he succeeded.

C. *An anus opening at the fourchette in a little girl*, as in the case published by M. Brachet, could be readily restored to its natural situation. A straight bistoury guided by a grooved sound through the fistula into the intestine, and directed from before backwards, or from the perineum to the coccyx, or from above downwards, would divide all the tissues which had caused the deviation. A canula fixed in the rectum near the posterior angle of the wound, would enable the solution of continuity in front to cicatrize, and the matters to reacquire their normal direction. The same operation was recommended by Vicq d'Azyr in cases of vaginal anus. M.

Martin recommends, that after having incised the entire septum from above downwards, and from before backwards, as in the preceding case; and after having placed the canula in such manner that it may go a little beyond the fistula above, that we should reunite the wound on its anterior surface by means of the suture. This last stage of the operation, which is undoubtedly the most difficult, does not appear to me to be necessary. If the derivative tube is properly adjusted, the reunion of the divided tissues in front will be effected without the intermediation of the threads. There would also be a mode of avoiding this, and of accomplishing the same result with less inconvenience; this would be to ascertain, by means of an instrument curved backwards in the form of a blunt hook, and brought from above downwards, through the fistula, to what point the intestinal cul de sac descends, and then to penetrate into the rectum by a puncture from the skin towards the pelvis, without dividing the recto-vaginal septum.

D. In infants of the *male sex* we have not the same resources. As the meconium only comes out at the time of discharging the urine, it does not, though it shows that the anus is entero-vesical, indicate either the direction or precise seat of the termination of the rectum. If it escapes from it at every moment or at intervals, and without any mixture of urine, the opening is probably in the urethra. Although we cannot always ascertain whether it is at a short distance from the glans penis, as M. Monod has seen it, (*Bibl. Méd.*, 1829, t. II., p. 447,) or deeper in, and near the perineum, as it is found to be in most cases, we have nevertheless good grounds to anticipate some success in such cases, by a methodical perforation at the usual place of the anus. In the first case, as in those where nothing outside can enable us to understand the interior condition of the parts, the operation, as it would, so to speak, be made at hazard, would necessarily be attended with less chances of success. To incise the perineum and neck of the bladder in the same way as in lithotomy, in order to create a large common issue both for the urine and stercoral matters, in those cases in which the intestine terminates in the bladder, would be a remedy, if not as dangerous, at least as revolting as the disease itself. The infant in whom Cavenne de Laon deemed it advisable to make trial of this operation, died in the course of the evening, and M. Martin of Lyon who has recommended it, had doubtless not reflected that his process, by leaving the recto-vesical anus in its congenital state of constriction, could not have been attended even with the advantage of prolonging the life of the child. If M. Ferguson, (*Arch. Gén. de Méd.*, t. XXVIII., p. 563,) has succeeded by operating in this manner, the cases of Zacutus-Luzitanus, and of M. Willaume, are much less calculated to inspire confidence.

## § II.

*The method of seeking for the intestine through the tissues which separate it from the cutaneous surface, is the only one up to the present time which presents any prospect of success in obscure cases. The infant is to be held, with its limbs apart and flexed, upon the*

knees of an assistant, or upon a table properly prepared. The surgeon placed in front explores the perineal or inter-gluteal depression if any exists; if he encounters no indication of anus or intestine, he endeavors to recognize the point of the coccyx and places the centre of his incision at about ten lines in front of this bone, and then divides first the skin to the extent of from ten to fifteen lines, and afterwards in succession the different layers which present themselves, until he comes down to the depth of an inch or two, that is to say, down to the intestinal cul de sac, should any present, or until he has lost all hope of finding it. The left forefinger, which constantly serves as a guide to the instrument, of itself applied from time to time to the bottom of the wound, would enable us to perceive the projection and fluctuation of the distended organ, and to ascertain in what direction it would be advisable to carry the point of the bistoury or trochar. In commencing, this dissection should be nearly in the axis of the body, that is to say, almost perpendicularly; afterwards we should incline it by degrees towards the sacrum, in order not to touch the bladder, and that we might follow the usual track of the rectum. The trochar in this respect is less certain than the bistoury. As the bladder in some degree fills up the pelvis when the intestine is wanting, it will almost inevitably perforate it. Moreover, it too readily escapes into the midst of the soft parts, to allow us here, to place any great confidence in it. Puncture, in whatever way we should employ it, could not, without danger, be substituted for dissection, unless the sac, filled with its matters, was recognizable either to the finger or eye, or upon the skin, or at the bottom of the wound. Having once entered into the rectum we enlarge the incision with caution in different directions, and especially in that where there appears to be the greatest room. We then introduce into it a tent of linen or lint, or even a canula, which terminates the operation. We have nothing more to do than to keep open the new anus, to give it a sufficient degree of breadth, and to prevent its coarctation or obliteration. To incise layer by layer the tissues, sphincter, levator ani, &c., as M. N. Roux has done, (*Arch. Gén. de Méd.*, 2d ser., t. V., p. 475,) is neither better nor worse than the ordinary method. To apply to the anus in these cases, what M. Dieffenbach has done for the lips, that is to say, to detach the extremity of the rectum in order to bring down its mucous membrane and sew it on the skin, would at the same time be attended with great danger and but little efficacy, and in most cases would be impossible. M. Amussat, (*Gaz. Méd.*, 1835, p. 753—*Arch. Gén. de Méd.*, 2d ser., t. II., p. 237,) who has done this in one instance, does not say whether his patient remained cured. This operation, which we have frequent occasions of practising, is rarely followed by a complete cure. Roonhuysen, F. de Hilden, (Bonet, *Corps de Méd.*, p. 438,) and De La Motte, who have been most successful with it, allow that most of their patients ultimately died at the expiration of a few months, or one or two years. B. Bell, who has obtained some successes from it, asserts positively that it is almost impossible to prevent the new opening from closing up again. The infant operated upon by M. Jodin soon succumbed. I have performed the operation on six patients. Four died: two after a manifest improvement; the third at the expiration of six

weeks, from neglecting the precaution of keeping in the canula ; and the fourth from my not being able to find the rectum, which was continuous, by means of a filament, with the body of the bladder. The two others were cured, one at La Charité in 1837, and the other in the practice of M. Layraud in 1838. Failures in cases of this kind have nothing in them to surprise us. If the cure obtained by Wagler, after having in vain incised the perineum, and afterwards plunged, on the following day, a lancet into the rectum, which he thought he could distinguish at the bottom of the wound, remained permanent and without any obstruction, this was owing doubtless to his not having been obliged to penetrate very deep, and to the intestine not having been very distant from the sphincter. I would make the same remark in regard to the little girl operated upon by the surgeon referred to by M. C. L. Lèpine, and who died three years subsequently of an entirely different disease, and also in regard to the more fortunate case related by M. Miller, (*Arch. Gén. de Méd.*, t. XIX., pp. 591, 595.) The cause of this failure is but too readily explained : the lost portion of the intestine can never be re-established but in a very imperfect manner. It is a fistula which we substitute in place of the natural tube. The species of mucous surface which ultimately becomes developed, can but very feebly represent the tunics of the anus. Though the system be incapable of entirely closing up stercoral fistulas, it has a constant tendency to diminish them, so that they soon become nothing more than mere ducts for the passage of fluid matters. The absence of the sphincter especially, is a fatal bar to success. When this is the case, it would be extremely probable that the anus, which had been artificially re-established, would be one of the most difficult to keep open. It would be an error however therefore to conclude with Dumas and some others, that an artificial anus on the side of the abdomen is always to be preferred. This also is nothing more than a fistula devoid of a sphincter, and in all cases where it could be located in the perineum it certainly would be attended with still less unpleasant consequences. Among the successful cases above mentioned, we may moreover add also some others, that of M. Fristo, for example, (communicated by the author, 1838,) though he was obliged to penetrate to the depth of three and a half inches.

### § III.—*To establish an Artificial Anus.*

A. Littré is the first person who, in cases of imperforate rectum, suggested the proposition, viz., in 1720, to construct an artificial anus in the iliac region, at the expence of the sigmoid flexure of the colon. We can scarcely understand how Dumas, (*Journ. de Méd. de Sédiolot*,) who, after Toutain, (*Journ. de Méd.*, 1786, t. LXVI., p. 90,) suggested the same process in 1797, should have given himself out as the inventor of it. A. Dubois had already, in 1783, performed it on an infant who died on the tenth day. Duret (*Bull. de la Fac. de Méd.*, 3d year, p. 112) also had recourse to it with entire success on the 18th October, 1793, while M. Pilhore of Rouen was no less fortunate. But the infant operated upon by Desault, in 1794, survived only four days. The case of supra-pubic abnormal anus mentioned

by Voisin of Versailles, also encouraged the anticipations which had been entertained from the results obtained by Duret and M. Pilhore, inasmuch as the infant was enabled to live by discharging his stools through this opening. Since that epoch, it is true, those hopes have been deceived in many cases. M. Ouvrard of Angers, (*Lancette Franc.*, t. II., p. 99,) lost his patient in 1820, as suddenly as Desault did. M. Roux was not more fortunate in 1831, in a similar case; and the same was the result in the patient of M. Monod, (*Bibl. Méd.*, 1829, t. II., p. 447.) Which after all is the operation which would never deceive the expectation of the surgeon? M. Serrand, (*Thèse*, Montpellier, 1814; *Bull. de la Soc. Anat.*, May, 1839, p. 90,) who saw the patient operated upon by Duret enjoying good health at the age of 21, states that he performed a similar operation successfully upon a little girl in 1813. The little patient being laid upon its back with its thighs extended, is to be held by one or two assistants. The operator being commodiously situated, makes a little above Poupart's ligament, between the antero-superior spinous process of the ilium and the pubis, an incision of about two inches in extent, then divides layer by layer the skin, *fascia superficialis*, aponeurosis of the obliquus externus, the lower fibres of the obliquus internus, the *fascia transversalis*, and the peritoneum, which opening he afterwards enlarges by using a grooved sound to conduct the bistoury. The intestine, which is distended and of a livid or greenish color, spontaneously presents itself behind the wound, and is recognized moreover by the aspect of its external envelope and by the arrangement of its fibres. We now proceed to seize it and bring it to the outside by the forefinger acting in the manner of a hook, or by using the thumb in connection with it. A noose of thread which is immediately passed through the mesentery, prevents it from re-entering. We open into it in the direction of the wound of the belly; the matters now escape, and it becomes emptied. We place a tent or meche in the division, if we are fearful of its closing up too speedily. Adhesions soon become established between the surface of the colon and the lips of the wound in the belly. We withdraw the mesenteric thread from the third to the fifth day, and the new anus, which is then definitively formed, requires no further attentions than those demanded by any artificial anus whatever.

B. *The process of Callisen*, which consists in penetrating at the side in order to reach the left lumbar colon between the two layers of its mesenteric duplicature, and without opening into the peritoneum, has never been put in practice on a living person. I am wrong; M. Roux has once made trial of it, and the little patient died two hours after. It is not worthy of being rescued from the oblivion to which the moderns have consigned it. Incomparably more difficult, and not less dangerous than the preceding, it would be also more inconvenient. I am informed however that it has just been performed by a surgeon of Paris upon a woman affected with an organic contraction of the intestine, and that the patient is doing well, (10th June, 1839.)

C. *Process of M. Martin*.—Nor has the process imputed by M. Paris to A. Dubois, and which served as a text to M. L. A. Martin in his thesis, viz., that of conducting through the iliac opening of the

intestine, according to the process of Littre, an exploring instrument from above downwards, so as to ascertain if it would not be possible to re-establish the natural anus by perforating the perineum, been up to the present time attempted, except upon the dead body. We should be wrong however in proscribing or rejecting it in an absolute manner. If by chance we had been deceived, and the rectum descended sufficiently low down to be made continuous as far as the skin, without being attended with too much difficulty, we should be in a much more favorable condition to perform the operation. A flexible sound, or one that was properly curved, would in the first place enable us to ascertain in what condition the parts were situated. I would not however recommend either the large flexible canula nor the enormous trochar of M. Martin, for the purpose of transfixing the parts in this manner from the interior to the exterior. It would be better, in my opinion, to look for the point of the explorator, by penetrating through the perineum, or if it should be found possible to introduce through the pelvis a sonde-à-dard, the arrow of which pushed as far as to the outside of and in the direction of the anus, would become the conductor of the bistoury during the remainder of the operation. However, as it would be somewhat imprudent to multiply in this manner the incisions at the same sitting, and that there would be always time sufficient to do this afterwards, we might wait before we did so until the health of the infant had been restored to its natural state, and when we could thus choose an epoch apparently more suitable.

D. If the safety of the method of Littre had been sufficiently demonstrated by experience, *new-born infants* would *not have been the only persons* to derive some advantage from it. It might equally be applied to the sufficiently numerous cases of intestinal obliteration which show themselves after birth. Every coarctation of this kind being fatal, we cannot see what objection there would be to the establishment of an artificial anus. The difficult point evidently would be to ascertain with certainty, first, that the obliteration exists, and then that it has its seat in the rectum, or in the lower portion of the iliac sigmoid flexure of the colon, or, at least, in the large intestine, so that in placing the anus in the right iliac fossa, it might be placed above the disease. We nevertheless still succeed in doing so in quite a considerable number of cases. Braillet had no doubt of it in the patient whose history he has given. Nor was M. Martin Solon deceived in the fact cited by M. Paris. This result was scarcely less evident during the disease of Talma. I could make the same remark of a woman who died in 1825 at the clinique externe of the school, and whose dead body I examined. This process, moreover, would require no other modification than this; that in place of always being performed on the left, it might become indispensable to direct the instrument upon the right iliac fossa, if the coarctation were situated in the transverse or ascending colon. After all, this operation does not exist only in theory; I have already said this (see this vol., supra), in speaking of gastrotomy, and of practitioners who had had the boldness to perform it on living man, and that M. Martland, (*Bull. de Fér.*, t. VIII., p. 204—t. XIV., p. 255,) who was the first to make trial of it, viz., in 1814, was so fortunate as to cure his patient.

## ARTICLE II.—CONTRACTIONS.

Coarcations situated in the rectum, whether congenital or acquired, and which are not cancerous but purely organic, are susceptible of the same operations as those of the urethra. The species of fold or valvular border which is observed in the interior of the rectum, a little above the sphincter, which no person had clearly pointed out before the time of M. Houston, and which represents a kind of pylorus, explains their great frequency at the upper part of the anus. Higher up they depend almost always upon ulcerations or degenerescences that are difficult to reach, or upon that species of fleshy ring described under the name of an upper sphincter by M. Nelaton, (see my *Anatomie Chirurgicale*, 3d edit., Paris, 1837, t. I., introd.) and, consequently, they yield with less facility than the first to surgical remedies.

§ I.—*Dilatation.*

The employment of dilatation in contractions of the lower portion of the rectum, which was so much eulogized by Desault, and since the time of that author by the majority of surgeons, merits, in fact, a part of the encomiums which have been bestowed upon it. All those indurations which are the consequence of chronic phlegmasias, and which occupy only the mucous membrane or subjacent cellular tissue, and also even certain lardaceous degenerescences, admit of the trial of this process. Dilatation acts here like compression in the external engorgements, and upon the same principles. The excentric pressure which it makes, compels the effused matters which have become solidified in the midst of the natural organic tissues, to re-enter into the general circulation, restores the intestine gradually to its original thickness by enlarging it, and in many cases breaks up the morbid process by destroying its germ. But this result is not obtained with equal facility upon all the points of the rectum, nor in all the different kinds of coarctation. If the disease consists of prominences which exist to a greater extent external to, than in the interior of the canal, or if it occupies a point which is too unfavorably situated for the pressure to be made with accuracy, or if the apparatus is badly applied, the dilatation, in general, will do more harm than good. It is executed by means of meches of lint spread with cerate or medicated pomade, which are daily renewed and gradually increased in size. These meches, which may be replaced by any other pliant or flexible cylindrical body if necessary, are applicable to affections of the anus, properly so called, and those of the upper portions of the rectum. Between the sphincter and the concavity of the sacrum it is almost always necessary to proceed in another manner. A small linen sac, which is introduced empty in the manner of a purse which is reversed, and which is filled with lint in order to make compression from above downwards as well as upon the contour while we are withdrawing it, is then most suitable and ought to be preferred to bladders distended with air, water or liquids of any other description.

These two methods nevertheless have an inconvenience which is common to both of them, that of arresting the course of the matters

and thereby occasioning a considerable degree of irritation in the greater number of patients. It would be advisable, therefore, to imitate M. Bermond of Bordeaux, and to substitute the apparatus recommended by this physician in place of the meches or purses which I have just mentioned. This apparatus consists of two canulas which are about six inches long, one internal, smooth and terminated above in a cul de sac, the other external, open at its two extremities, and having on its outside at different intervals, circular grooves, in order to attach a chemise to it. They are introduced, sheathed in this manner, into the organ. By means of long forceps, we glide lint between them and their linen envelope, in such manner as to push back this latter in the shape of an annular border as far as to the top of the instrument, and in such manner also as to make a greater degree of compression in one direction and less in another, according as it may be found to be necessary. The whole apparatus is fastened outside. When the patient has need of going to stool, we withdraw the internal canula and without deranging the other, which may have as much as six lines in diameter. The tail-piece, formed by the chemise above, almost of necessity encourages the matters to enter into this part, which matters may be rendered more fluid and diluted, if necessary, by means of injections or lavements. We afterwards replace the central canula, which locks by a lateral eperon into a notch which is on the outside canula near its free extremity. The fusiform suppositories contrived by M. Fardeau, (*Journ. Hebdom.*, 1835, t. IV., p. 116,) whether they are hollow, solid, or ovoid, or terminated below in a funnel, or of silver, ebony, or gum-elastic, or those of softened ivory, which I prefer, are still more commodious. The meches, small sacs of linen, bladders, and double canula of M. Bermond, are no longer applicable, when the finger cannot reach up to the diseased point. M. Costallat (*Gaz. Méd.*, 1834, p. 11) has therefore contrived, for these particular cases, a small apparatus, which may be introduced to more than a foot in depth, and which in other circumstances also should not be neglected. I have already spoken of it in treating of contractions of the urethra. This is also a chemise, but in the form of a cundum, which is preceded by a long blunt-pointed probe and conducted by a gum-elastic catheter, after which it is transformed into a meche by means of portions of cotton, which are pushed up into its interior by a forked stilette. Its inventor informed me that he had used it with advantage on a number of persons, among others upon a female patient whom several distinguished surgeons had supposed to be incurable. But this patient afterwards came to La Pitié, where I had an opportunity of examining her, and found the coarctation of the intestine had returned to as great an extent as at first. It is unfortunate that it is so much complicated as to prevent its coming into general use, for the idea upon which it is based is ingenious, and it would be desirable to have it simplified in such manner as to enable every person to make use of it.

## § II.—*Incision.*

Before dilatation had been proposed, and also even since it has been employed to a very considerable extent, incision of the coarcta-

tions of the rectum was had recourse to either as an auxiliary means or as the principal remedy. Wisemann performed this operation three times on the same patient, and Ford had the good fortune to effect a cure in his without a return of the disease. The same remark applies to M. Copeland, (*Dublin Hosp. Rep.*, p. 150,) who had, moreover, to excise various tumors upon the intestine. The operation in other respects is attended with but little difficulty, unless we have to go very deep. The blunt-pointed bistoury, conducted flat-wise upon the forefinger, and then introduced into the contracted circle, is the only instrument we require. Its cutting edge being turned towards the walls of the intestine, divides them upon one or on several points, and in such manner as not to go deeper than the thickness of their tissue. A large sized meche or fusiform dilator is then introduced as far as to above the wound, after which we proceed in the same manner as in simple dilatation. M. Bégin (*Elem. de Chir.*, 2d edit., t. I., p. 327) has like myself succeeded by adopting this process. The kiotome or bridle-cutter of Desault would be applicable to cases of this kind, if any particular instrument were deemed necessary. We might also use the pharyngotome, as M. Duplat has done in one instance with success. As soon as the finger can no longer accompany the bistoury, the incision is attended with too much danger to be thought of for a moment. In conclusion, the annular contractions or those in form of a bridle, or that are semilunar, are the only ones that admit of a trial of this process; and it is only, in fact, for the purpose of preparing or favoring the dilating means to be made use of, that it can be seriously recommended.

### § III.—Cauterization.

It is a matter of surprise that caustics have not been applied to contractions of the rectum in the same way as to those of the urethra. There is every reason to believe, however, that they would produce the same effects; and that the nitrate of silver used topically, or as an escharotic would add greatly to the success of dilatation, by destroying the phlegmasic germ upon the mucous coat of the intestine, in the same manner as it so frequently does in the excretory canal of the urine. But I am hardly aware that it has yet been used in such cases, and therefore cannot, without some other foundation than theory, or the analogies derived from imperfect trials made by myself, enter into farther details on this subject. I find, however, an instance of this kind which is quite conclusive, in the thesis supported by M. Duplat. (See on the subject of contractions of the rectum, the thesis of M. James, Paris, 1838; a memoir of M. Maslieurat, *Gaz. Méd.*, 1839; and the work of M. Syme, *on diseases of the rectum*, 1838.)

[*Polypi of the rectum*, when found, as they not unfrequently are, in children, appear under certain modifications distinct from those in adults. M. Gigon of Angouleme, (see Hervez de Chégoine in *Arch. Gén. de Méd.*, &c., Paris, 4e ser., t. I., pp. 489, 490,) states that they are, according to his researches, destitute of an epithelium, of moderate size, and have quite a slender pedicle. They are not apparently an exciting cause of prolapsus of the gut, so common in childhood,

inasmuch as this last infirmity is usually found in debilitated constitutions, while the polypi are met with often in robust children. M. Gigon divides these polypi into three classes: mucous, vegetative, and fleshy. They are also provided with vessels, and though M. Gigon has rarely found any unpleasant hemorrhage from their excision, M. Roux considers that this may occur, and should be guarded against by a precautionary ligature. M. Roux, in applying a double ligature to the pedicle of a polypus in a lady, had to observe much caution, for fear of passing the needle through the *arteries* which he distinctly felt pulsating in this connecting part.

*Tincture of iodine* in its strong and undiluted state, injected into the track of an *anal fistula*, completely closed it up and effected a radical cure of the disease, in a case in which it was made trial of by Dr. Charles Clay, (*London Medico-Chirurgical Review*, Oct., 1843.) The careful introduction of a meche into the intestine to a point beyond the intestinal opening, enabled him to ascertain by its color that the iodine had passed completely through the abnormal canal. T.]

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## CHAPTER II.

### BODIES TO BE EXTRACTED FROM THE RECTUM.

#### ARTICLE I.—FOREIGN BODIES IN THE ANUS.

The nature, form, and size of foreign bodies that have become arrested or been introduced in the lower part of the rectum, present so many different varieties that no systematized operation or fixed process can be applicable to them, so that their extraction requires, so to speak, to be modified for each particular case.

#### § I.

*The fingers and thumb*, the dressing or lithotomy forceps, or the entire hand when it can be introduced, are the first means that suggest themselves. The hand of an expert child, as was done in the patient who had stuck a cologne-water bottle above his sphincter, as mentioned by Nollet, or the hand of an intelligent midwife ought to have the preference, if the hand of the surgeon should be too large. A man had introduced a vial into his rectum, and M. Cumano, (*Gaz. Méd.*, 1838, p. 793,) extracted it by means of Boer's forceps. A drill or turrell would be a valuable acquisition, if the foreign body in question was a fragment of wood or vegetable, or animal substance, and solid and not flexible, as is proved by the cases related by Saucerotte and M. Bruchman. A pig's tail introduced by its base, and the hair of which previously shorn off, would rub against the intestine, should be treated as Marchettis suggested, (Bonet, *Corps de Méd.*, t. III., p. 277,) in that courtesan who was a victim to the students of Gottingen: by means of a thread tied to

its lower extremity, he succeeded in gliding over the foreign body from below upwards a reed tube, which thus quickly isolated it from the walls of the intestine, by forming a sheath to it, and immediately allowed of its extraction, without any difficulty.

### § II.

A patient had thrust into his rectum a *pot for preserves*, with its open extremity first. A violent irritation was the consequence of this singular manœuvre, and the intestine soon became inverted from above downwards into the pot in the form of a red tumor, which filled up its cavity. Desault was not enabled to extract it until he had applied two strong forceps successively on the two opposite points of one of its diameters. In place of two we might even employ four forceps, either in order to draw with greater force, if it were necessary, or to dilate at once on a greater number of points of the anal contour. A large ring or ferule, or metallic goblet would doubtless be found to yield to this means. If it were a glass or crystal or porcelain, or any fragile body whatever, the forceps would enable us at the same time to break it if it should appear impossible to remove it entire. M. Manunta (*Gaz. Méd.*, 1838, p. 185) made use of a lithotritor to break a coffee-cup which a young student had introduced into his rectum. A narrow saw, protected by a gorget and the forefinger, might be used in the case of a fragment of wood, horn or ivory, which had become fixed transversely on each side of the wall of the rectum; while foreign bodies of steel, iron or silver might in some instances require the aid of cutting tenacula or cutting pliers themselves.

### § III.

*Biliary calculi*, and hairy balls, (égagropiles,) which are sometimes found in the intestines of men as well as in those of animals, should be broken up by means of strong tenacula or cut into fragments with long and strong scissors, should the hooks, the hand, and turrell and drill not be found sufficient. Hardened faecal matters, bullets, and stercoral stones, which in many persons are the source of accidents, the character of which is so frequently misapprehended, also do not yield in certain cases except by the use of blunt hooks or the finger, or wooden spoons of greater or less length, or the delicate hand of a child or woman. M. Thiaudière, (*Bull. de Théráp.*, t. VIII., p. 29), by introducing his entire hand into the intestine, was enabled to extract from it an enormous wooden fork five inches long. The cases related by J. Warren, Van Swieten, Camper and J. L. Petit, as well as those by Guillemeau, Schurig, Callisen, Vicq d'Azyr, and MM. Gibert and Ouvrard, show what we have to fear and what resources we have to employ in such cases.

### § IV.

*Calculi*, giving rise to constipation, have been extracted from the rectum by Schmucker, by means of the forceps; and also by the ordinary forceps, after having broken them up, by Chambon and M.

Miller, (*Arch. Gén. de Méd.*, t. XIX., p. 593.) J. S. Buzzoni removed from it a coffee-cup by means of a whalebone busk. Plater (Bonet, *Corps de Méd.*, 2d part, obser. 31) says seriously, that a mole, introduced alive into the rectum of a peasant, had become so strongly attached to it that it could not be extracted except by drawing upon its tail after having killed it!

### § V.

We do not proceed to *debridements* and *incisions*, either of the anus or intestine, on higher points of its walls, until after having satisfactorily established the insufficiency or inutility of these various means. We then, as in the preceding cases, have recourse to the jointed speculum, or to the simple speculum, having a slit of two to three lines, which divides its whole length on the free side, as recommended by M. Barthélemy, either for the purpose of dilating the anus or favoring the action of the other instruments. As to the incisions themselves we sometimes make them with the straight bistoury protected by a bandage, sometimes with the straight or curved probe-pointed bistoury, directed or guided upon the finger, and finally, sometimes with a strong pair of scissors. In conclusion, foreign bodies in the rectum are treated scarcely in any other manner than those in the vagina. M. Cazenave (Brochure in 8vo., 1837) was obliged, in one case, to extract a broken gourd from it. A pestle, which could not be withdrawn without difficulty by means of the forceps, caused rectitis and death in a patient of M. Dor, (*Gaz. Méd.*, 1835, p. 139,) who succeeded better in another case in extracting a fork, the teeth of which were directed downwards, and who states that he removed a cologne-water bottle in a third patient by means of Hunter's forceps. To the above mentioned resources there ought, I think, to be added in both cases the employment of lithotritic instruments, while we should recollect that in the rectum or vagina, the litholabe, perforators and stone-breakers may be managed with more facility and less danger than in the bladder or urethra.

### ARTICLE II.—POLYPI OF THE RECTUM.

Polypli of the rectum, though not very rare, are nevertheless not very common. At the height of 6 or 8 inches, it is almost impossible to reach them, and consequently to ascertain their existence. While they may be more easily reached in proportion as they are lower down, they also yield to the same methods as for those found in the sexual organs in woman. Their excision also is effected with too much ease to allow any attempt at arrachement and cauterization. The ligature itself is scarcely ever adapted to them in any case. Above the sphincters they are secured by means of a double erigne or erigne forceps, which is then handed to an assistant to hold. If the anus presents any difficulty, a jointed speculum is introduced into it. The surgeon then, provided with a long pair of scissors curved flatwise, and protected by the left forefinger, divides its pedicle. Lower down the excision is made in the same manner as for hemorrhoids, which will be mentioned presently; in both cases we put our-

selves on our guard against hemorrhage, by the means which will also be described farther on. The excision of a small fungous, pediculated tumor from the anus, was followed by so copious and so sudden a hemorrhage, that the patient, who was a young soldier, would have died if M. Serre (*Compte Rendu*, 1838, p. 35) had not promptly had recourse to tamponing of the rectum. MM. Manec (*Journ. des Conn. Méd.*, January, 1839, p. 107) and Meric, in excising a fungous polypus from the rectum, after having ligatured its pedicle, found a copious hemorrhage ensue at the expiration of twenty-four hours. The patient was afterwards restored without any accidents.

### ARTICLE III.—HEMORRHOIDAL TUMORS.

Hemorrhoidal tumors, bourrelets (collars), and tubercles, which M. Le Pelletier (*Des Hemorrh.*, &c., Thèse de Concour. Paris, 1834) has examined under all their varieties in his excellent thesis, and which are sometimes concealed in the interior of the anus, and visible only when the patient makes an effort at stool, and which sometimes protrude externally, are the source of a great number of inconveniences and dangers as soon as they have become definitively established, in spite of the methodical and judicious employment of antiphlogistic, detergent, astringent, and escharotic topical means, together with compression. Cauterization with nitrate of silver succeeds only in the beginning, or only when they are yet very inconsiderable in size. The red-hot iron, which was so much extolled by the ancients, (Dujardin, *Hist. de la Chir.*, p. 500,) and which M. A. Séverin was so vexed at being prevented from using in a patient of distinguished family, in consequence of the obstinacy of the *cowardly physicians* (*lâches medecins*) of this personage, would doubtless succeed better and in a greater number of instances; but those resources which surgery at the present day possesses, and which are at the same time more certain and less repugnant, have long since cast it into oblivion.

#### § I.

At the present day the *ligature* itself, though of easy application, is generally laid aside in France, notwithstanding the arguments adduced in its favor by M. Mayor, (*Gaz. Méd.*, 1832, p. 24.) The tumors that have no pedicle, or the simple bourrelets, do not admit of its employment, and the examples given by J. L. Petit show that in other cases it may give rise to the most serious accidents, such as violent pains, syncopes, convulsive movements, and inflammations of the intestine and peritoneum, whether we afterwards wait for the spontaneous separation of the morbid production, or whether, on the contrary, we excise it immediately outside the thread, as had been already recommended by Galen. It is true however that M. Brodie (*Kleinert's Repert.*, March, 1836, p. 92) avers that he has employed the ligature on hemorrhoids in 300 instances, and only lost a single patient; I will add with M. Gibson, that my experience does not allow me to coincide with the prejudices of J. L. Petit against this remedy; but as the internal hemorrhage attributed by M. A. Cooper or M. Brodie to excision has rarely taken place among us, it is very

natural that we should not have the same confidence in the ligature to hemorrhoids that these practitioners have. Excision therefore at the present time is almost the only operation which ought to be had recourse to for these affections.

## § II.

*Excision of hemorrhoids* in itself is rarely attended with any great degree of difficulty. It can only in reality be serious in consequence of the hemorrhage, or inflammation, or purulent infection which may result from it; from whence it follows that the best process must be that which incurs the least risk of these accidents, and which is most certain to be exempt from them.

A. *Ordinary process*.—The patient being laid upon the edge of the bed, or a table properly prepared, with the under thigh extended and the other flexed, so that the anus may be perfectly exposed, is to be held by several assistants. The surgeon placed in front of the affected part, ought, according to Boyer, to seize with a good pair of dissecting forceps or an erigne, all the tumors in succession, proceeding from those which occupy the most depending point to those that are highest up, and then detach them one after the other by means of the bistoury or a strong pair of scissors. If they do not protrude externally, an effort similar to that on going to stool compels them to come out; but as the pain caused by the removal of the first tumor almost always occasions a considerable retraction of the anus, which draws back the others into the bottom of the rectum, it is important not to excise any of them until they are all secured, with a like number of erigues or forceps, or by traversing or surrounding each of them with a thread. To dissect them in the manner of cysts, in order to remove only the smallest portion possible of their mucous membrane or skin, as some authors propose, is altogether superfluous. It is a piece of advice moreover which is much easier to give than to follow.

I. *The loss of substance* here has nothing in it alarming. The wounds cicatrize very well, and after the cure the organ usually regains all its suppleness. The dressing consists of the introduction of a meche of some size besmeared with cerate, inserted to the depth of several inches, and supported outside by coarse lint, compresses and a T bandage. M. Pl. Portal, (*Clin. Chir.*, &c., p. 147,) in extirpating an erectile tumor which had become implanted in the anus and upon the neighboring integuments, met with entire success, and his patient was restored in five weeks.

II. *Hemorrhage*.—Should we apprehend ever so little loss of blood the dressing is to be no longer as simple. Boyer begins by introducing to a considerable depth a long tampon of lint nearly cylindrical in shape, and also solid, and embraced by two strong ligatures, which are crossed on its upper extremity, and knotted and firmly secured upon its lower extremity, and the extremities of which, collected together in two pairs, remain pendant outside of the anus. We afterwards push in below this a number of small balls of lint or additional free tampons in such manner as to fill up the end of the rectum with them. Fastening the whole below by means of a large

roll of lint placed between the buttocks, over the anal opening, the surgeon then draws upon the two ligatures and knots them on this roll with a sufficient degree of force, to make the lint contained in the intestine apply itself from above downwards against the bleeding surfaces, at the same time that the tampon outside tends to push it backwards, from below upwards. Finally, a large plumasseau and then compresses and the T bandage complete the dressing. In this manner it is almost impossible for the blood to make its escape, while pure and simple tamponing would only have the effect of preventing its showing itself outside, while it would force the blood to effuse itself into the intestine, and thus transform the external into an internal hemorrhage, which would be still more dangerous. On the other hand, if the compression is not accurately made, nor with sufficient force, and if the apparatus of Boyer or J. L. Petit is not properly prepared, or is badly applied, the same accident might also happen. Moreover, it produces in some cases acute suffering, an almost irresistible desire to go to stool, a sense of weight which it is difficult to support, colics and even fever, and other symptoms, also, which render its employment quite difficult. Also it is frequently indispensable that an assistant should support it during the space of some hours by means of his hand, and that we should enjoin upon the patient not to make any effort, but resist with all his moral energy the desire which he may feel to expel it, but which rarely fails to subside after the first few hours. I have no necessity of adding that we should remove all the dressing in order to reapply it better, if the swelling of the belly, syncopes, paleness, and contracted pulse should indicate that the blood continues to flow; nor is it required to say, that the sensation of a weight, or of a foreign body, which in certain cases is acutely felt even in the absence of every kind of dressing, would be augmented instead of being moderated by any of those efforts of defecation which the patient is forced to make almost in spite of himself, and which he ought to abstain from at every hazard. If the chemise canula of M. Bermond had been tested under such circumstances I would willingly recommend it, (see dilatation of the anus, above.) By means of this we might change, modify, and renew the dressing, and augment or diminish the compression without taking off all the pieces, and moreover, satisfy ourselves, by removing the central canula, whether blood had or had not become effused into the intestine, and also could allow the matters to be expelled as often as the patient felt a desire for it, and do this during the space of several days if we judged it advisable.

B. *The process of Dupuytren* rejects all precautions of this kind. This surgeon immediately applies a red-hot iron on the bottom of each of the wounds he has made, wherever he has reason to apprehend the slightest hemorrhage. He does nothing more afterwards than to place in the anus a meche of but small size, which moreover up is to be supported and kept as above described. In proceeding in this manner we scarcely ever find any accidents follow. Nothing distends, irritates, makes traction upon or compresses either the intestine, bladder or surrounding parts. The congestion which is so powerfully excited by the ordinary dressing, exists but in the slightest degree, and the hemorrhage consequently has very little tendency to

make its appearance. In this respect the hot iron has the advantage of rendering the operation prompt, and is far from producing as much pain as the tamponing. The inflammation, while it is less disposed to extend or to react at a remote distance, is not so liable to attack the veins which open themselves at the bottom of the wound, nor is the development of those purulent collections caused by phlebitis or resorption, of which I saw two patients die at the hospital of the School of Medicine, in 1824 and 1825, so much to be dreaded. I do not know, in fact, if the cautery is in reality indispensable. The arterial vessels which are divided are of such little importance, that the wounding of them at first sight would not appear to forebode much danger. The mouths of these vessels if left to themselves would probably soon cease to give out blood, and I should not be surprised if the precautions recommended to prevent hemorrhage were, in quite a considerable number of cases, the cause of its occurrence. It appears to me, therefore, that in a majority of cases they might be dispensed with; and that it is from excess of prudence that they are recommended in cases where the loss of blood at first is not abundant. What, moreover, would prevent our having recourse to them at a later period, in cases where the hemorrhage should continue to go on to an alarming extent? Nothing is more easy when the wounds are at the exterior. If they were deeper the patient, by making some efforts, could soon expose them to the view of the operator, who could then cauterize them without difficulty. Finally, the tamponing would be a dernier resource, which we could always call to our assistance in time. Two patients in whom I proceeded in this manner, in 1831, at La Pitié, had no reason to regret it. The same has been the case with a great number of others whom I have since operated upon. I have, however, seen three patients succumb from this operation, one from purulent infiltration into the cellular tissue of the pelvis, the second from a phlebitis, and the third from an erysipelas caused by the excision of a small simple pediculated tumor.

*C. Process of the Author.*—With the hope of better avoiding hemorrhage, inflammation and purulent infection, I have proposed to unite by first intention the wounds made by excision of hemorrhoidal tumors and bourrelets. For this purpose I secure to the outside, and by means of an erigine, each tumor which is to be removed, and then traverse their root by a sufficient number of threads. Immediately dividing the tissues in front of them, by means of the bistoury or a strong pair of scissors, I have nothing more to do than to seize, in succession, all the threads, in order to knot them, and thus make the same number of points of simple suture. Meches and tamponing are then unnecessary, and a complete cure is frequently effected from the 10th to the 15th day.

## CHAPTER III.

## THE FALL OR PROLAPSUS OF THE ANUS.

The descent of the fundament is an accident which must not be confounded with the protrusion through the anus, in consequence of intussusception, of a more or less extensive portion of the intestine from a greater or less distance above. The first is owing, as Friderici (*Thèses de Haller*, t. I., p. 8, French trans.) had already demonstrated, to a relaxation of the mucous coat of the rectum, while the other depends upon an actual intestinal invagination. This latter is less uncommon than is supposed at the present day. M. Paillard (*Rev. Méd.*, 1829, t. II., p. 398,) gives an instance of one, and M. Nélaton has related others. I have also seen some cases. The peritoneum itself was included in the tumor in the woman dissected by M. A. Bérard, (*Soc. Anat.*, 6th March, 1828.) The first alone, however, requires the aid of special operative processes. In infants, in whom it is very common, the progress of age and the employment of appropriate topical applications almost always succeed in curing it. In adult age it is no longer the same. Its obstinacy then frequently becomes the source of annoyance to practitioners, and of despair to the patient. When the tumor only shows itself at each stool, and returns afterwards with facility, it constitutes without doubt a very troublesome infirmity, but one which does not compromise life; whereas if the patient cannot succeed in reducing it, it may be strangulated by the action of the sphincter, and become inflamed or gangrened, or give rise to symptoms of the most alarming character. In the patient of M. Sauveur (*Ansiaux, Clin. Chir.* 2d ed., p. 179,) it was completely detached by means of mortification.

## ARTICLE I.—REDUCTION.

In order to reduce this tumor we proceed in the same manner as in cases of eversion of the vagina or womb. After having cleansed it with tepid water, and then besmeared it with a mixture of oil and wine, the patient being placed upon his back, with his breech more elevated than the abdomen, and all the muscles relaxed, we envelope it with a fine line, in order afterwards to make gentle compression upon it from the circumference to the centre, and from below upwards, by means of the palms of the hands or the pulp of all the fingers, at the same time that the patient is prevented as much as possible from making use of any effort. We sometimes succeed better by making pressure on the centre of the mass, by means of several fingers united together in the form of a cone, as if for the purpose of entering into the anus, by pushing before us the compress which covers the tumor, and which is kept around it by the other hand. A large sized meche, with or without a sac, is one of the means frequently employed to keep up the reduction. The dilated bladder of Blegny, (*Peyrilhe, Hist. de la Chir.*, p. 38,) Morgagni or Levret, (*Art des Accouch.*, 3d edit., p. 38,) as employed by M. Dieffenbach, (*Arch. Gén. de Med.*, t. XVI., p. 287,) as

the ring of Bassius, the bandage of Cousin, the astringent suppository of Turner, a tampon of lint contained in a linen bag, or a globe or oval body of wood, ivory or gum-elastic, and in women a pessary in the vagina; with astringent injections and hygienic means, are the remedies to be made trial of for preventing the return of the prolapse of the gut. M. Gervais (*Journ. des Conn. Méd-Chir.*, 1839, p. 67,) having a case of extensive prolapsus of the rectum, which he was desirous of keeping up, made use successfully of a ball of cork, which he withdrew at the expiration of 30 hours. Simple reduction equally succeeded with M. P. Dalmas, (*Journ. des Prog.*, 2d ser., t. I., p. 266,) though the prolapsus was accompanied with serious accidents. Another remarkable example also of the same kind, has just been published, (*Gaz. des Hôpit.*, 1839.)

#### ARTICLE II.—DEBRIDEMENT.

If the reduction had become absolutely impossible through the usual methods, or if it were attended with danger, we ought not to hesitate to divide the sphincter on one or both sides of the root of the prolapsus. With the left hand we should push aside the tumor, while with a straight bistoury in the right hand, we would incise the integuments and afterwards the muscular ring, that is to say, from within outwards by commencing in the vicinity of the intestine. An operation of this kind, performed by Delpech; (*Mem. des Hôp. du Midi*, 1830,) upon a young person was followed with complete success.

#### ARTICLE III.—EXTIRPATION.

When nothing can prevent the parts from protruding again, or when in spite of every effort they persist in not entering, they knew no other means to oppose to it forty years since, and many authors at the present day still know no other, than that of *ablation*. This, moreover, is an excision or exsection which is in itself quite an easy matter, and which is performed nearly in the same way as for degenerated hemorrhoids, or for a polypus or any other tumor having a considerable base. Extirpation, which was recommended also by Percy, completely succeeded in the hands of Cowper and Pasquier. It is unnecessary, however, to remove the tumor as far up as its root. Should we destroy only the two lower thirds of it, the remainder will invariably re-enter. Perhaps in this manner the muscular tissue of the rectum might be respected, and its mucous tunic only divided, without rendering thereby the success of the operation less probable. The dressing and subsequent treatment scarcely differ from those mentioned for hemorrhoids. This remedy, as is perceived, is sufficiently severe, and so also is it far from being always successful. Though M. Phelys (*Bull. de la Fac. de Méd.*, 1808) has succeeded, a great number of other practitioners have failed. Fortunate is it that modern surgery may almost always dispense with it by substituting for it a process which is less alarming and less painful, and which only has the disadvantage of not being applicable to cases of irreducible prolapsus; and of being restricted in its results to the retention of the tumor when it has been once returned.

## ARTICLE IV.—PROCESS OF HEY AND DUPUYTREN.

This process consists in the excision of the radiating duplicatures at the margin of the anus, whether they be or be not occupied by hemorrhoidal tubercles. It appears certain that in the majority of cases the obstacle to the cure lies in the dilatation of the sphincter or a considerable degree of relaxation which has taken place in its mucous membrane and in the skin which is continuous with it externally. The cellular tissue which lines them acquires finally so great a degree of pliancy, that it enables them to glide with the slightest effort over those layers to which they are naturally adherent, and to whose movements only they are restricted, when there is no disease present. The ablation of a certain portion of the cutaneous tissue has a surprising effect in removing this anomaly or inconvenience, and becomes in this manner the remedy for the disease which so frequently results from it. The idea first suggested itself to Hey in 1788, in the case of a Mr. W., of Hull, who had been formerly treated by Sharp, and in whom the anus after the reduction continued constantly to be surrounded by a thin, pendant cutaneous duplicature (thin pendulous flap) which was from 8 to 12 lines long, having on its inside, near its base, several soft and bluish-colored tubercles, similar to those which are seen in persons who have been a long time affected with hemorrhoids. "It appeared to me," he remarks, "that the prolapsus was owing to the relaxation of the very lowest portion of the intestine and of the cellular membrane which unites it to the surrounding tissues." This remark was a ray of light for the author. He considered that in order to cure his patient, no other remedy was necessary than that of strengthening the adhesion of the tissues around the anus, and the appropriate action of the sphincter itself. Nothing appeared to him better calculated to fulfil this intention than the excision of the tegumentary flap and of the tubercles which were found appended to it. He hoped by this means to cause an inflammation which would be capable of producing a more solid adhesion of the rectum with the surrounding parts, and did not doubt that a *circular* wound would necessarily bring about a greater degree of constriction of the sphincter ani. Hey removed therefore the pendant bourrelets and the bluish tubercles by means of a bistoury. The operation was performed on the 13th November, and M. W. wrote to him in March, 1789, that the cure continued perfect. A second patient operated upon in the same manner, in 1790, was restored in three weeks, though the excision was only made upon one side. In April, 1791, Hey again had recourse to his process, and removed the pendant flap, at the same time encroaching about a quarter of an inch upon the red membrane which lines the anus. The success was no less complete than in the two first instances. A lady whom he also treated, in 1799, in such manner however as to remove, only after the interval of a certain lapse of time between the two operations, the two soft tubercles which were situated on the two sides of the anus, recovered equally well and in as short a period. Nevertheless the successful results that Hey met with rested, so to speak, in oblivion, even in his own country. M. S. Cooper, who mentions them, speaks of them in too

obscure a manner to enable practitioners to derive any great benefit from them, and but for Dupuytren, to whom the same ideas suggested themselves, and who was thereby enabled to construct a method upon them and to generalize it, they would probably have attracted no more attention in France than they had done in England up to that period.

*Operative process.*—An injection or even a slight purgative should have been administered on the evening previous. The patient is to be placed in the same way as for the excision of hemorrhoids. The surgeon seizes in succession with a good pair of forceps, each radiating fold which he wishes to remove, and excises them with a sharp edged pair of scissors from below upwards, commencing upon the margin of the anus at about an inch from the sphincter, and terminating at some lines above it. Dupuytren says that the removal of four of them is sufficient, one in front, another behind, and one on each side. I deemed it necessary in one case to excise six, and in another eight, because of the extreme relaxation of the parts, and the great dilatation of the anal opening. It is unnecessary to say that we should give a greater or less degree of breadth to each strip that we excise. We commence the division more or less below, and terminate it more or less above, according to the condition in which the parts are found. One of Hey's patients had a hemorrhage, but I am not aware that Dupuytren met with this accident. As the English surgeon has not given any detail, either in relation to his process or the dressing, we are not enabled to say whether the loss of blood he mentions, is to be imputed to the operation itself, or to the manner in which it was performed. The professor of the Hotel Dieu limits himself to covering the wounds with a plumasseau, imbued with cerate, and places no meche, or but a very small one in the anus. In two instances I have adopted an opposite course. The meche, which I introduced to quite a considerable depth into the rectum, was of the size of the finger. I detached several parcels from it, and lodged them in each wound, where I kept them separate by means of coarse lint, and afterwards by a large plumasseau with compresses and a T bandage. My intention was to prevent the immediate reunion of the small wounds, and to oblige them to suppurate, in order to obtain an inodular cicatrix, which would be more elastic and firmer, and adhesions which would be more solid, than those resulting from primitive cicatrizations. I have had no reason to be dissatisfied with my course. The cure was complete; but I ought to acknowledge that the more simple dressing preferred by Dupuytren, cannot be much less advantageous, since the patients who were submitted to this treatment were also restored without any return of their disease. To those who are familiar with the difficulty attending the cure of prolapsus ani, and with the inconveniences which it involves, the operation which I have just described will prove an invaluable acquisition. One of the cases which most excited my attention when I arrived in Paris in 1820 was a successful result of this kind. A woman who had been delivered in the surgical wards of the Hotel Dieu, and who for 14 years had never gone to stool without her anus falling down in the form of a red livid tumor as large as the two fists, was almost instantaneously cured by the ab-

lation of some of the folds of its skin. M. Paillard asserts that this operation, which was frequently performed by Dupuytren after the year 1815, never failed but in one instance; and also that this single failure was to be attributed possibly to the process adopted. On my own part I have performed it on five patients at the Hospital of St. Antoine, La Pitié, and La Charité—two were women and three men, and its immediate results were no less conclusive. The same has been the case with the operation as performed by MM. Mauge-  
nest, (*Gaz. Méd.*, 1832, p. 857.) Giorgi, (*Journ. des Conn. Méd.*, t. I., p. 349,) Lutens, de Cock, (*Bull. Méd. de Gand.*, t. I., p. 37,) Ammon, (*Bull. de Fér.*, t. XIX., p. 64,) and Dieffenbach, (*Gaz. Méd.*, 1831, No. 2.) M. Heustis also was successful, (*Ibid.*, 1834, p. 777,) by excising a circular fold around the anus. The radiating cauterizations which were formerly used by Moreau, (Saviard, *Obs.* XIV., p. 55,) in the direction of the duplicatures of the anus, in order to contract this opening, might moreover have suggested the idea of the method of Dupuytren. I should remark, however, that the cure is not always permanent. In one of my patients there was a return of the disease at the expiration of a year. In May, 1839, I saw an Englishman who had been formerly operated upon by Dupuytren, and in whom the prolapsus had also been reproduced. If the prolapsus still shows itself at the first stools which succeed to the excision, it is rarely as marked as it was before, and returns of itself or with less difficulty, and soon disappears entirely. The freedom of the belly favors the success of the operation by exempting the patient from making as much effort during his stools, and must in consequence be attended to by means of injections, or laxative drinks, or mild purgatives. Finally, the excision of the radiating folds of the anus seems calculated to answer for cases of prolapsus, which are owing to a state of relaxation of the mucous membrane, integuments, sphincters, and external tissues; for all those cases in a word which are not caused by an organic lesion, or disorganization of some of the parts contained in the pelvis or hypogastrium; so that the amputation of the tumor should be reserved for those cases of prolapsus which are absolutely irreducible.

#### ARTICLE V.—CAUTERIZATION.

A means which acts nearly in the same way as the preceding operation is that of cauterization. Cauterization with the red hot iron, which was employed with success by Ansiaux, (*Clin. Chir.*, 2e edit., p. 174,) in several patients, and by M. Philips, (*Rev. Méd.*, 1833, t. III., p. 452,) and M. Kluykens, (*Gaz. Méd.*, 1834, p. 777,) has been again eulogized by M. Burggraave, (*Bull. Méd. de Gand.*, t. I., p. 37,) as one of the most certain and easy modes of remedying prolapsus ani. First proposed by Leonidas, it had also been extolled by Marchettis and Psyter; but I can scarcely conceive what advantages it can have.

**ARTICLE VI.—THE INTESTINE PROTRUDED THROUGH THE ANUS.**

Twelve inches of intestine, which had protruded through the anus, were successfully reduced by Lacoste. These kinds of prolapsus, which have been mentioned also by F. ab Aquapendente, Muralt, Saviard, Sabatier, Puy, G. Roux, Salmuth, Starke, Martin Solon, Lambert, Hagen, Lettoom, Castara, &c., almost always terminate in a fatal result. It is said however that a patient was cured by tearing off himself the invaginated mass, and I have already quoted, while speaking of extirpation of the uterus, the singular history of a woman who was said to have survived the destruction of the uterus, vagina, and rectum. The reduction and the retaining of the parts which I have spoken of farther back, are nevertheless the first remedies to be made trial of in these cases.

**ARTICLE VII.—FISSURES.**

The fissure or crevasse of the anus is a small narrow elongated ulcer which develops itself between the radiating folds of the fundament, and causes in the majority of patients the most acute pain. The most ancient authors speak of it in such vague terms, that no person, before the researches of Boyer, thought of separating it from the other anal ulcerations. Aetius, in mentioning it, appears however to have already had reference to constriction of the sphincter. Avicenna enumerates the causes of it, without having had any very distinct conception of its character. Albucasis, who points out its treatment in detail, imputes it to constipation of the belly and to the desiccated state of the stercoral matters, and Grueling does not distinguish it from the ordinary rhagades, though he had already assimilated it to the crevices seen on the hands of servants during winter. Lemonnier, the first writer who has distinctly described it, compares it, like Grueling, to the cracks upon the hands or lips, and accurately defines its seat, but does not establish its mode of treatment. Sabatier makes only a slight allusion to it in his *Medecine Operatoire*, while all the other authors of repute, both abroad and in France, down to the present times, have given no description of it. It was not however because it is a rare disease, for Boyer, in 1825, announced that he himself had already met with 100 examples of it. I myself have noticed more than 30 cases of it. But up to that time its origin had been imputed to affections altogether different, to the venereal disease, hemorrhoids, disease of the bladder, to a blind or a complete and concealed fistula, a preternatural incurvation of the coccyx, and even to the existence of a cancer, either of the uterus, prostate or rectum. The description which E. Home gives of the accidents caused by the engorgement of the lateral lobes of the prostate might also well be classed under this head. "There is," says this author, "a great difficulty in going to stool, and a tenesmus, accompanied with violent pain, which is increased by the efforts which the patient makes to relieve the intestine." The table which M. Copeland has given, of what he calls spasmodic contraction of the sphincter, also appears to me, at least in great part, to have reference to this disease. It has frequently been confounded with the rhagades and other

superficial exulcerations of the anus. The remarks of Guy de Chau-liac and Dionis in reference to it leave no doubt on this subject. Thus fissure at the anus was not in reality known as a distinct disease until after the year 1822. M. Blandin believes with M. Hervez de Chégoïn that the fissures situated below or above the sphincter, constitute a disease of little importance, and one which is cured by simple means or disappears spontaneously, while the others only present all the series of inconveniences presented by Boyer. But this distinction is purely theoretical. Among the patients whom I have seen there were many in whom the crevasse had given rise to exceedingly violent pains, though it was entirely disconnected with the muscular ring which surrounds the termination of the rectum. The constriction of this muscle is a point which requires special elucidation. Is it the cause or is it the effect? Boyer, upon the strength of the fact that he has several times encountered the constriction without fissure, that he has never seen the fissure without constriction, and that the section of the sphincter, even without touching the fissure immediately, causes the accidents to subside, adopts and defends the first opinion. Others, basing their opinions on the ground that the ulceration may exist without its being possible to perceive it, pronounce themselves in favor of the second opinion. It cannot be denied, in fact, that the fissure may sometimes take place without constriction, though it may be at the same time accompanied by its other symptoms, four or five examples of which have fallen under my own observation. Again, who could assert that the fissure was wanting, merely from the fact that it has not been found? The case related by M. Louvet is in reality of no weight, since the patient was not even explored. The confidence which is due to the experience of Boyer, is in fact, the source of all the value attached to the observations he adduces in support of his opinion, for the truth of his assertions has never been verified in the examinations of the dead body. The practitioner, when he reflects that a crevice irritated by the passage of alimentary matters, may cause a spasmodic contraction of the subjacent muscular fibres, and that it is inconceivable how a muscular constriction can produce a fissure, will, as it appears to me, accord his adherence by preference to the second opinion.

### § I.—*Signs.*

The accidents which denote a fissure are of two orders, viz., those which have reference to the disturbance of the functions, and those that relate to the appearance of the parts themselves. This disease, when it exists in an extreme degree, is accompanied with excruciating torments. At the moment of going to stool, the patients compare their pains to those which would be produced by the introduction of a red hot knife into the anus. This sensation of burning exists sometimes to such degree, that it produces the most inconceivable anguish, with symptoms of convulsions, and accompanied with syncopes. To others it appears as if some person was tearing out the fundament. During the interval between the stools, they sometimes experience only a burning sensation, lancinating pains that are more or less acute, a sense of weight, and some symptoms of colic. As the stools

approach, however, the pains sensibly augment, and do not reach their extreme point of violence, except at the moment of the expulsion of the matters, after which they continue to diminish during the space of some hours. The constipation becomes so obstinate, that the alvine evacuations would only take place at intervals of 8, 10, or 12 days, unless they were solicited. The patients dreading them beyond any thing that can be imagined, recoil from them at the moment they are to take place as much as possible. Nevertheless, they are aware that their infrequency renders them so much the more painful. One, two, three, or four injections, which are sometimes required to procure a single evacuation, at other times are wholly insufficient. Purgatives alone, administered by the mouth, succeed in opening the belly. Hence there are certain patients who feel themselves under the necessity of taking a cathartic every other day. A lady who was treated by Boyer, had come to the determination of keeping a canula fixed in her anus. A patient at the Hotel Dieu, stated that he would much rather die than go to stool again. The liquid state itself of the matters does not in all patients exempt them from suffering, as is proved by a case related by Boyer. Though some may walk, or seat themselves, or attend to their occupations for several hours in the interval between their paroxysms, others are obliged to keep their bed, though it becomes a source of distressing irritation and fatigue to them. The lancinating pains extend towards the bladder or the uterus, according to the sex, and even reach in certain cases the highest part of the hypogastrium; the products of digestion become altered; the patient eating but little, from apprehension of having stools, loses his natural color; and his features soon express the sufferings he endures, in so marked a degree, that it would be supposed he was laboring under a profound organic lesion. In respect to the anus, the introduction of a syringe, meches, canulas, or a foreign body of the smallest size, reawakens the apprehension of the alvine evacuations. The pain occupies quite a circumscribed space of the contour of this opening, and is frequently accompanied with pulsations similar to those which would be produced by a phlegmon. The finger encounters here a constriction which cannot be overcome without producing the most severe exacerbation. When we press on any given point of the interior of the sphincter, the pain immediately acquires such a degree of acuteness, that it draws forth piercing cries from the patient. If we separate its folds apart, the eye finally perceives at the bottom of one of the grooves which lies between them, a small ulcerated fissure, one to two lines broad, and from four to eight or ten lines long. Its borders are usually neither callous nor tumefied; and its surface in quite a number of cases is of a very bright red color. In this respect we cannot convey a more exact idea of it than by comparing it to the chaps which are seen on the hands and feet, in country people during winter, much more than to those on the lips. Different from rhagades and other exulcerations, it gives out scarcely any exudations, and rarely stains the linen. The contrary of this however sometimes takes place; in a small number of cases there sometimes exudes even streaks of blood with the fæces, but these occur only as exceptions. Fissures of the anus, from being concealed between the tegumentary

duplicatures, are not always readily discovered. We can only detect them in certain cases by means of the closest examination, and by *spreading out* the skin of the fundament with the greatest care, and by making the patient protrude the anus a little, as if for the purpose of going to stool; in most of the cases the anus is retracted to a great depth. The situation of the fissure, moreover, has no fixed locality. Though ordinarily on the side and to the right or left, it is also sometimes seen behind or in front. In some cases it is so low down as scarcely to reach the beginning of the mucous membrane above, or it may be placed so high up above the sphincter as not to reach the skin below. It is not unfrequent to find a hemorrhoidal tubercle forming, as it were, its root, and receiving, so to speak, its tail. Most commonly, however, it is situated in such manner that its commencement is located upon the entrance of the anus itself, while its other extremity reaches to a greater or lesser extent towards the intestine. When not distinguishable by the eye, the finger passed around upon the different points of the anal circle above and below, may be more fortunate. If there is a fissure, the pain becomes poignant as soon as it is touched. A hardness, the appearance of a tense cord, and rugosities that are more acutely sensible than the remainder of the intestinal opening, indicate its presence. But this mode of exploration is not in reality indispensable, except the crevice is too high up to allow us to draw it down so as to expose its location to view. We shall not moreover confound an alteration of this kind with organic coarctations of the rectum, if we take care to notice that the suppleness of the tissues is preserved, and that we experience a sharp, sudden contraction, instead of a permanent constriction with degenerescence of the parts. It is too easy to distinguish it from internal or external hemorrhoids with or without excoriations, also from chancres and other ulcers, and from fistulas and affections of the prostate or of the bladder, or sexual organs in women, to make it necessary for us to dilate upon its differential diagnosis. Three essential symptoms therefore characterize fissure at the anus: 1st, burning pains at the moment of passing the stools; 2d, a superficial, narrow, long ulcer, or sort of crevice, at the entrance of the intestine; 3d, a violent and painful constriction of the sphincter, without any appearance of organic lesion. Moreover, it is not accompanied in all cases indiscriminately with the long catalogue of phenomena which we have just described.

### § II.—*Treatment.*

Fissure at the anus, if left to the resources of the system, may endure to an indefinite length of time. Since it has been examined with care, it has not yet been possible to ascertain in an authentic manner that it has ever been cured without the aid of art. The patients exhausted by their sufferings, fall into a state of wasting decay and thus succumb, or ultimately become attacked with some incurable organic disease. An English lady who had rendered her life supportable for several years, says Dupuytren, by the use of calomel, did not effect a cure. Baths, leeches, bleeding, calmants, anti-spasmodics, purgatives, lavements, and injections of every description

furnish no better sources of relief. Nothing will succeed, according to Boyer, but the incision of the sphincter. On this subject we must understand ourselves: simple fissures unaccompanied with constriction, whether they be syphilitic, hemorrhoidal or dartous, or of any other nature, evidently yield to milder means. The ancients, who confounded all of them under one designation, could not have been always deceived in speaking of their pomades and other medicaments. Before laying it down as a fact that this or that medication has cured the patient, it becomes necessary, if we would not reproduce the confusion which, in this respect, has so long existed in science, to give positive demonstration that the fissure was actually accompanied with a constriction of the sphincter. But this unfortunately has not been done in the majority of cases published up to the present time. M. Blandin, for example, in saying that the fissure has callous borders and a grayish bottom, and in distinguishing it only by its seat in place of endeavoring to discover its nature, would reproduce, doubtless unintentionally, the obscurity which was so happily dissipated by Boyer. For myself, I wish to be understood as speaking here only of a true fissure or painful crevice at the anus.

A. *Various Medications.*—I cannot understand why Albucasis, who recommends that we should abrade the fissures with an instrument or the nail until they are made to bleed or tumefy, or why Guy de Chauliac and Dionis, who cauterized or scarified them, may not have also succeeded in curing them in some cases, if it be true, that in our days Guérin has eradicated them with the red-hot iron, and that the nitrate of silver has frequently succeeded; nor can I share with the moderns in their aversion to such remedies. A species of balsam which usually soothes, but with which Boyer obtained success in one instance only, which, however, was only a case of mild constriction, is made of the following materials; hog's lard, syrup of rhubarb, syrup of nightshade, and oil of sweet almonds each, 5 ounces. Some spoonfuls of this are injected into the rectum with a small syringe two or three times a day. It is probable that the blanç-rhassis, and most of the pomades recommended by the ancients, possessed the same qualities. Dupuytren appears to have made use with advantage of a mixture of extract of belladonna two ounces, water sweetened with honey two ounces, and hog's lard two ounces, which was introduced into the anus upon a meche besmeared with it. M. Descudé says that we may cure the fissure by administering oil of hyoscyamus in large doses by the mouth, at the same time that we employ mercurial ointment as a topical application. M. Lamoureux (*Soc. Méd. de la Seine-Infér.*, t. IX., p. 78,) states that he has succeeded by employing belladonna, or repeated lotions, as is recommended by Mothe, (*Arch. Gén. de Méd.*, t. XVII., p. 648.) Douches of cold water and decoctions of chervil or of poppy heads, have also been extolled. I have succeeded in two or three instances in causing the fissure to be besmeared morning and evening with a pomade of white precipitate one drachm, and hog's lard one ounce. But the three remedies which have been most zealously recommended for some time past have, nevertheless, been cauterization with the lapis infernalis, dilatation and the section of the sphincter.

B. *Cauterization.*—By attacking the whole extent of the fissure

with a crayon of nitrate of silver, we may hope, by changing the condition of the surfaces, as was done by rasping, excision, or the actual cautery, to transform it into a simple wound. Béclard, who stated that he had employed this method with a success almost unvarying, was, however, opposed before the Academy by M. Richerand, who affirms that he never derived any benefit from it at the hospital of St. Louis. Three of the patients, also, in whom I made use of it not having obtained the slightest relief from it, I was induced to believe that Béclard had only had recourse to the nitrate of silver in fissures without constriction, or that his successes were to be attributed to the dilating meches which he used at the same time; but the cures which I have since obtained by the aid of this means in decidedly marked cases of fissure, oblige me to change my opinion.

C. *Dilatation.*—The employment of meches of lint gradually increased in size, until they overcome the resistance of the sphincter, appear to have had more efficacy. Béclard himself states that he had reason to be well satisfied with them. M. Marjolin and MM. Nacquart and Gendrin, also appear to have obtained unquestionable cures from this remedy. The great point is not to diminish after the first, but to increase them rapidly to the largest size possible, whatever may be the resistance of the sphincter; the pain, which is excessively acute during the first hours, afterwards subsides by degrees, and disappears in a great part before we have reached to the fourth or to the fifth meche. There is no objection, moreover, to the dilating body being besmeared with one of the pomades above indicated. I cannot, meanwhile, withhold the comparative experience that I have had in this treatment, though I have yet made but three trials with it. Ordinary meches besmeared with Boyer's mixture, have effected neither more nor less than the pomade of Dupuytren, or that with belladonna and opium without acetate of lead, or that of mercurial ointment, either simple or in combination with opium. Having obtained no amelioration from the employment alone of the populeum ointment, blanchnasis, pomade of precipitate, and cauterization with nitrate of silver, I put the dilating meches to the test, sometimes besmeering them with cerate only, and at other times with the medicated pomades, when the result proved to be decidedly the same in both cases. Copeland had already employed dilatation in spasmodic constriction of the anus, and I am of opinion that those physicians who would have sufficient resolution to engage their patients not to give way before the first suffering, might obtain decided benefit from it. The three cases which have been published by M. Mondière, (*L'Expér.*, t. III., p. 264,) come in support of the opinion which I formerly expressed on this subject.

D. *Incision* of the sphincter, as proposed by Boyer, and since adopted by almost all surgeons, is the means which, up to the present time, has procured the greatest number of cures; so much so that its inventor considers its success almost infallible. Béclard and MM. Richerand, Roux, and Lagneau, however, have cited cases in which it had failed in their hands. Consisting of a deep incision on one or both sides of the anus, necessarily makes it a resource which must be of an extreme character, and one which patients do not always assent to without much opposition. We ought not therefore

to propose it, except as a dernier resort, and after having unavailingly made use of the other operative methods. The preparatives which are then similar to those of the operation for fistula, still more imperatively demand that we should cleanse out the large intestine on the evening before, and two or three days in advance, by the aid of injections and mild purgatives. The articles, which are composed of a straight, blunt-pointed bistoury, and an ordinary straight bistoury, a large meche, a T bandage and all the essential accompaniments, being arranged in order, and the patient laid upon the edge of a bed, with his head depressed, the under thigh stretched out and the other bent, and his two buttocks stretched wide apart by the assistants, the surgeon then introduces the forefinger of his left hand as far in as beyond the sphincter, and using it as a guide to glide in flatwise the blunt-pointed bistoury to such depth as is required, immediately proceeds to make the incision. Though the fissure ought in some respects to be the locality of the wound, it must however, in consequence of the urethra or vagina, be left intact, should it be situated on the median line in front. Boyer considers that it will always be found sufficient to divide the muscle on one of its sides without paying attention to the fissure; but prudence, if not necessity, as it appears to me, makes it preferable that the bistoury should make the incision in the fissure when the latter can be discovered. We then prolong the incision upwards and downwards with the straight bistoury, for an inch or two upon the skin, and in such manner that the entire thickness of the sphincter may be divided. Unless there should exist several fissures, or that the constriction extends to too great a distance, a single incision will be found sufficient. Otherwise we make one on each side, and according to the same rules. If the borders of the cleft are callous or rounded, we seize them successively with the forceps, and excise them with a single stroke of the bistoury or scissors. After this there is nothing to attend to but the dressing, for hemorrhage under such circumstances is almost impossible. The operator immediately introduces the meche and causes it to enter to an inch at least beyond the superior angle of the incision. After having detached some portions of it, and placed them in the wound, he fills up the intergluteal groove with coarse lint or with gateaux; places a few long compresses over this; then supports the whole by a T bandage, and causes the patient to be carried back to his bed if he had been removed from it. The subsequent treatment and other dressings are the same as in fistula.

*Relative value of the different methods.*—In fine, fissure of the anus appears to be susceptible of a cure in various ways. Its lips by being kept either in perfect contact or completely separated apart during a certain length of time, allow of cicatrization by the first intention, or admit of the thorough cleansing of the wound. The puckering of the anus, or the constriction of its sphincter, by spreading open or approximating its walls on the slightest movement, destroy in this manner at every moment the conditions that are indispensable for its consolidation. Caustics and excision, by imparting to it the characters of a recent wound, ought to favor its agglutination and thereby possibly effect a cure in a certain number of cases,

though they may not therefore be a radical remedy for it. Unguents, pomades, &c., being capable only of modifying its nature or surface, must on that account alone succeed still less frequently. Dilatation by forcing the duplicatures of the fissure to spread out, obviates its constant laceration, prevents the irritating matters from becoming arrested and stagnating between its lips, and enables it to close in the same manner as a simple excoriation. If the incision acts directly upon the fissure it is immediately merged in the remainder of the wound and no longer presents any peculiar feature. When the sphincter has not been divided by the instrument, its fibres in retracting approximate the walls of the wound, and thus obliterate it in such manner that no particle of matter can glide in between them, so that time is given them to become solidly agglutinated before the anus has resumed its usual functions. Thus in theory as in practice, incision is the method which presents the best chances of success; but this operation is not exempt from every danger, though in general it is easy and may consist of nothing more than a simple debridement. If Boyer has never been disappointed in his expectations, there are others who have been less fortunate. In my knowledge two patients have died from this operation. One who was a young woman of strong and robust constitution did not succumb until after the lapse of several months. Adhesions had become established among the organs of the pelvic cavity, and the cellular tissue in the neighborhood of the intestine contained pus in a state of infiltration. The other, who was a man 35 to 40 years of age, was seized on the 12th day with a violent entero-peritonitis, and died in my department at La Pitié, in the month of November, 1831. A considerable number of purulent collections were found under the peritoneum of the pelvis. The incision of the sphincter, however, had been attended with no peculiar circumstance. If the idea of a large sized meche alarms the most of those to whom it is proposed, the introduction of the finger, which must precede the incision, is scarcely less repugnant to them. Perceiving in the first case that their sufferings diminish instead of augmenting, they soon recover from their terror; while in the second case they have to dread, in addition, the consequences of a bloody operation. Prudence, therefore, would seem to dictate that we ought to make trial, in succession, of some of the principal topical applications recommended, and even the nitrate of silver and the dilating meches before we proceed to the incision.

E. *Excision.*—With the view of avoiding the division of the sphincter, I deemed it advisable to suggest the excision of the fissure itself. This method, which was extolled by Mothe and Guérin, and which I had already indicated in 1832, has now been frequently performed. Some of the essays which I made were published in the year 1836, (*Demonge, France Méd.*, t.I., p. 46.) Everything being arranged as above described, I seize the fissure with an erigne, then isolate it on the right and left with a cut of the bistoury, or simply extirpate it entire with a good pair of scissors. By this means the muscular tissue is respected, the operation but little painful, and the wound cicatrizes promptly, while the dressing is the same as after the incision. I ought to add, however, that two of the six patients

whom I treated by excision had the fissure reappear and have never been completely cured.

### ARTICLE VIII.—FISTULAS.

Fistulas in the anus, in the same way as the abscesses which precede them, present themselves under very variable characters. I shall not occupy myself with those which are caused by some alteration in the bones, or some deep-seated lesion in the interior of the pelvis, or abdomen, or in the genito-urinary organs. The only point under consideration here is those fistulas that are kept up by the condition of the lower portion of the rectum. Authors have admitted three varieties of these: 1st, complete; 2d, external blind; and 3d, internal blind fistulas: the first having two orifices, one at the exterior and the other in the anus; the second opening only externally, and the third only in the interior of the intestine itself.

#### § I.—Varieties.

Though the existence of complete fistulas has never been questioned, it is not the same with the others.

A. Foubert, and afterwards Sabatier, who were disposed to believe that there were no *external blind fistulas*, asserted that the absence of an internal opening was explained by the examination having been in such cases badly conducted. To this remark it may be replied, that one means of always detecting it, as some practitioners flatter themselves, is to make one complete with the sound or exploring probe, when there is none in reality. Their doctrine, founded upon the principle that fetid abscesses of the anus are always caused by a perforation of the rectum, has no longer need of being combated at the present day. The more the rectum has been attenuated, whatever may be the extent of the abscess, and the slower has been the destruction of the cellular tissue, and the more extensively it has spread in the ischio-rectal depression, or the more impaired the patient's constitution is, or the more it is implicated in those affections which modify the entire organism, the more is this kind of fistula to be apprehended after abscesses of the fundament; so that external blind fistulas far from being impossible, are, on the contrary, extremely frequent.

B. *Internal blind fistulas* have also been rejected by a certain number of authors. It would seem, in fact, that it is not allowable to admit of them but as a point of departure for complete fistulas. In the theory of Foubert for example, it would be difficult to conceive that when the intestine is opened into, there would not be formed an abscess which would soon become apparent externally, or that the collection could pour out its pus into the interior, over a certain number of days, without also making an external opening. Experience at the present time has produced a perfect unanimity on this point. My own observations are even calculated to make me consider internal blind fistulas quite a common disease. They are reduced, it is true, to a cavernous ulcer, whose pus is poured out into the rectum in consequence of the pressure of the surrounding parts, but which may per-

sist for months without making any manifest progress towards the skin. I have now seen at least a dozen examples of them. If the orifice is not very large, and situated below the dilated portion of the rectum, this in itself may be but very slightly irritated by the fæces, for the stools tend rather to close it up than to enter into it as they go out. We thus perceive that all discussion on a subject of this kind will be henceforwards confined to a dispute about words.

C. A *complete fistula* is not always simple; quite frequently there will be found one on each side. In other cases also it may have a greater number of openings externally, though there may be but one only in the interior. In certain cases it is pierced, as has been remarked, in the manner of the spout of a watering pot. Its intestinal opening, which in most cases consists of one only, has scarcely ever more than this when there is but one opening only externally. Instead of following a uniform direction, its track is frequently sinuous. The one on the left side for example may pass to the right. Its presence in front does not prevent it from having its origin behind, and vice versa. After having proceeded in one direction, it may happen that it will take another route, and form various angles before terminating at the skin. If a simple opening externally may sometimes receive various branches, it is still less rare when a patient has several passages, to find them all converge with more or less uniformity towards the perforated intestine. In place of one sinuous track, there may be sometimes found between its two extremities, passages of greater or less calibre, which are prolonged sometimes towards the ischium; sometimes above the coccyx and glutei muscles, and towards the sacrum, and into the pelvis; or at other times also they may surround the whole contour of the termination of the rectum, which latter is then suspended, as it were, in the centre of a vast purulent cavity.

## § II.

The precise situation of the internal orifice of complete fistulas has become during the last half century the subject of a very special investigation. The ancient authors, the entire Academy of Surgery, and Desault himself and most of his pupils, without appearing to suspect that such a principle could be contested, had maintained that we would find the rectal orifice of the fistula sometimes in close proximity to, and at other times at quite a considerable distance from the anus. M. Ribes, on the contrary, maintains that it is always or almost always situated above the external sphincter. This doctrine, advocated by M. Larrey, who like M. Ribes ascribes it to Sabatier, belongs entirely, if M. Pleindoux is to be believed, to Brunel, a physician of Avignon, who defended it in the year 1783 in a special treatise on the subject of fistula. In respect to Sabatier himself, there is reason to be astonished at the silence which he observes on this subject. It was in fact to be expected, after the language which M. Ribes imputes to him, that we should find him develope his opinion in detail in his *Médecine Operatoire*, in which work he says not a word of it. However this may be, the assertions of M. Ribes, from being supported upon numerous facts and careful dissections, could not fail to attract the attention of investigators. M. Roux and Boyer

still contend that there may be fistulas situated very high up, while M. Richerand has completely ranged himself under the new opinions. After the examples of those masters in the science, I desired to ascertain myself what was the truth in this matter. Out of thirty-five cases of fistulas which I was enabled to examine for this purpose, in the year 1833, either upon the dead body or during life, I found four in which the ulcer in the rectum was as high up as an inch and a half, or two or two and a half inches, and consequently a little above the external sphincter. A fifth example among these fistulas, even reached as high as over three inches, for it could scarcely be reached by means of the finger, but this was after it had made a long track between the mucous membrane and the other tunics of the rectum. The others opened at the entrance of the anus or at a few lines within it, in conformity to the opinion of M. Ribes. Three of them even had their orifice outside of the villous membrane of the anus, and two only were found a little nearer to the valve of the sphincter than they were to the integuments. I could at the present day enumerate as many as a hundred cases of this description, and in which the same distances were always observed. Thus experience, which concurs with the anatomical explanation which I have elsewhere given in relation to this matter, (*Dict. de Méd.*, 2nd edit., art. *Abcès de l'Anus*,) authorizes us in asserting that certain fistulas may open upon the skin itself at the entrance of the anus; that most of them have their orifice between the sphincters, and that it is also not very uncommon to meet with them at a short distance above. In remarking the distance to which the intestine is occasionally separated above, we find moreover an explanation of the reason why so great a number of practitioners have not thought of searching so low down for these openings. In fact, the probe separated from the forefinger only by the mucous membrane itself, will ascend sometimes without the slightest effort, in the same way as it would between two sheets of paper, as high in a great number of cases as to the distance of two or three inches in the direction towards the pelvis, though the fistula may be situated at some lines only from the anus. This circumstance arises from two causes: 1st, because the inner membrane of the rectum being denuded of its cellular tissue, easily allows itself to be separated by the instrument which glides between it, in such cases, and the muscular coat, in the same way as it would between two pieces of wet linen; 2nd, because the pus of the fistula or the humidities of the intestine, intercepted by the internal sphincter below, and by the external sphincter outside, find more facility in taking a reflux course upwards, between the coats of the intestinal tube itself.

### § III.—*Diagnosis.*

The recognition of fistulas in the anus is rarely attended with any difficulty; their differential diagnosis only sometimes presents some degree of embarrassment. Whether they be complete or incomplete, there always exists, provided they have an external opening, an ulcer at the margin of the anus. This ulcer has been preceded by an abscess or by hemorrhoids in a state of inflammation in the greater number

of the patients, and has already existed for a period of several months. Some persons however are unconscious of its origin, and have been affected with it for a long time without having been aware of it, considering themselves to be laboring only under fluent hemorrhoids, either internal or external. A small projection or tubercle of variable size, quite frequently conceals its orifice, which latter, in other cases, is hidden at the bottom of a kind of lacuna. Pressure usually causes a small quantity of pus to escape from it. The matter which comes out from it, and which *stains* the shirt of the patient, is sometimes of a reddish color, and, as it were, sanguinolent, sometimes ruddy and exceedingly limpid, while at other times it resembles greyish and serous pus. This ensemble of characters however, also belongs equally to a fistulous ulcer and to an external blind, as well as to a complete fistula. The faecal odor emitted by the matter, or the linen which is imbued with it, is perceived alike in both cases. The escape of gas would be a more conclusive sign, were not the air, which is introduced into the fistula while the rectum is empty, and when pressure from without inwards or from within outwards can cause it to be expelled, of a nature frequently to deceive on this point. In order to demonstrate with certainty that there is actually a fistula, it is necessary that certain particles of the substances which pass through the digestive tube should have made their escape from the ulcer; that we should have seen worms or other foreign bodies, or stercoral matters, or a portion of the liquids thrown up in the injections, make their exit from it; and that the patient, at the time of going to stool, should have perceived that wind or humid matters were passing through as they entered from the rectum. Such signs, it is true, are sufficient to remove all doubts; but as fistulas are not all accompanied by them, and as they are moreover purely rational, the surgeon is obliged to have recourse besides to those furnished by the probe *and by physical indications*. The exploration then requires that the patient should be laid down in the same way as for receiving an injection. The left forefinger introduced into the anus, proceeds at first in search of the internal ulcer, which is recognized without difficulty if it is large, and which, if it is narrow, is quite frequently indicated by a pain somewhat more acute, or by a small protuberance like a pullet's rump, but not always, as Pelletan thinks. The right hand then introduces the probe, which ought to be smooth and blunt-pointed, and small and flexible, unless the entrance of the fistula should be so large as to require but little precaution. The void which it meets with shows in which direction we should push it. If the exploring finger has found the internal opening, the remainder of the search is not difficult. In the contrary case the operator, always acting without any effort, leaves the instrument to penetrate, so to speak, of itself, makes it pass around the whole extent of the morbid cavity, and brings its point towards the anus and between the two sphincters, if it has not already been directed to that region in the beginning; then follows its various movements on the contour of the intestine by means of the finger which he has introduced into the anus, and does not withdraw it until after he has in vain searched into the different recesses and all the deviations, sinuses and passages

of the fistula; or until he has positively ascertained in some way or another the situation of the internal orifice of the fistula. His not being able to find anything in such cases is no proof that the fistula is incomplete; a bridle or sinuosities, or valvular folds, constitute so many obstacles which are to be taken into the account. In certain cases the finger does more harm than good, and is not to be introduced into the anus until afterwards. Injections of tepid water may be made trial of for the purpose of having more freedom in the passages. As they sometimes come back through the anus, it has also been recommended to make use, for these injections, of a colored liquid, or milk, or ink, or water, for example, tinged with saffron or sunflower, in order that its presence may not be mistaken. For the same reason such matters, if they were injected through the rectum, are of a nature to come out through the fistula.

The putting in of a thread, as M. Ruspoli recommends, (*Gaz. Méd.*, 1835, p. 505,) would make the simple injection still less instructive than the colored. We might, moreover, if it were necessary, freely enlarge its whole track by introducing into it tents of prepared sponge, or gentian root, or anything similar. When these various essays have been followed by no results, we may consider that the case in question is one of external blind fistula. Whatever Foubert may say of it, the contrary cannot be admitted save in the character of an exception. The signs of an *internal blind fistula* are not so numerous, but are less variable. After pains or symptoms of a deep-seated phlegmon, a certain quantity of purulent matters will be observed to escape from the anus. From that time the stools in coming out are found to be besmeared with them to a certain extent, while during the interval the shirt becomes stained with them. Sometimes also the ulcer precedes the abscess or deep-seated inflammation at the margin of the anus. Then the accidents develop themselves with more moderation at first and do not increase in intensity until afterwards. The finger meets with the same peculiarities in the intestine as if there existed a complete fistula. At the exterior we sometimes distinguish a simple painful induration, and sometimes a violet or reddish colored spot with or without attenuation of the skin. In pressing upon this point at the contour of the anus, we empty the pouch of which it forms the bottom, and pus is immediately effused into rectum. Moreover we are rarely called upon to ascertain the existence of an internal blind fistula, until it has reached to a very advanced stage; for up to that time patients pay no attention to them scarcely, and refer their difficulties to blind piles, for which they do not ask for any relief. *Urinary fistulas*, which show themselves in the neighborhood of the anus, are distinguished from the preceding, by the rose or particolored tubercle depressed in the form of a pullet's rump, which almost constantly conceals its orifice; also by the species of fibrous cord which is prolonged in the direction towards the bladder or urethra, and by the fluidity, color and urinous odor which exudes from them; also by the fact that fluids do not usually escape from them except at the moment when there is a desire to empty the bladder; likewise by the absence of surrounding cavities, and the direction the probe takes, and especially by the fact that this instrument cannot penetrate into the rectum.

§ IV.—*Prognosis.*

Fistulas at the anus in themselves are not dangerous. Those which have but one orifice, whether internal or external, blind fistulas in fact, frequently terminate of themselves in a fortunate result, though Boyer maintains the contrary; it is even certain that complete, that is, the true stercoral fistulas, sometimes disappear spontaneously. I saw a remarkable example of this in an old soldier, who had been a long time a patient at the Hospital of Tours. Another time, in a woman, I ascertained without the least difficulty, by introducing a probe, the presence of an anal fistula, at the beginning of the year 1831. Apprehending the attack of some pulmonary affection, I sent the patient into the country. She came back two months afterwards perfectly cured, and has continued to remain so ever since. M. Ribes relates two cases which are not less conclusive. Who does not know, moreover, that these fistulas will frequently close up during the space of a month or year, then reopen afterwards, and finally get perfectly well; and that a certain number of patients have them without caring to pay any attention to them, and finally find that they cicatrize without an operation? Such a result, however, is one that is entirely exceptional. In the immense majority of cases fistula in ano will not yield without the aid of art. Whatever may be the number of sinuses, we may obliterate them, provided they have not extended beyond the perineal aponeuroses above, and that they are not kept up by some local disease. If the fistula has existed for a long period of years, and is accompanied by vast cavities and by passages which extend beyond the coccyx, sacrum and glutæi muscles, laying bare the latter, as I have seen in several instances; or if the levator ani has been attacked and the intestine is extensively dissected beyond the reach of the finger, it is rare that we succeed. The most prudent course then, is to confine ourselves to cleansing means and palliative treatment. Like all wounds which suppurate, a fistula at the anus may give rise to the accidents of resorption. If fistula in ano ought to be respected in pulmonary patients, it is less because its cure aggravates the principal disease, than from the impossibility of effecting its cicatrization after having operated upon it. The contrary undoubtedly may happen, but it is only by exception. J. L. Petit, who was one of the first to investigate this subject profoundly, leaves no room for reply. M. Morère, with a view to subvert the principle which has been universally established in our days, by relating the case of a patient, who, after being operated upon for a complete fistula, afterwards recovered from his phthisis, forgets that this patient was not all phthisical.

§ V.—*Treatment.*

All the means employed in ulcers accompanied with separations of the integuments, or in sub-cutaneous fistulous ulcers, have been recommended for anal fistula. We may find in Avicenna the waters, unguents and balsams, recommended for this purpose by the ancients. The patients who were sent to the waters of Barrège and Bourbonne, and the liqueurs and pomades prescribed to Louis XIV., who him-

self was affected with a fistula in ano, prove that at the time of Dionis they were full as rich in resources in such cases as at the epoch of Galen and the Arabs. Purmann succeeded with lime-water, calomel, alum and orpiment. Bourdonnets of lint, good diet and detergent injections were found sufficient by Pallas. Injections of gum-ammoniac were not less efficacious in the hands of Evers, and it required all the experiments undertaken in the case of Louis XIV., to reduce such pretensions to their just value. Inasmuch as this disease sometimes gets well without the slightest assistance, it would not, after all, be surprising if such remedies had obtained a certain number of cures, unquestionable examples of which are to be found in the collection of Bonet; but, as art possesses methods which are incomparably more advantageous, they have been for a long time abandoned.

A. *Caustics*.—Caustics, employed at the remotest period of antiquity, since they are already mentioned by Hippocrates, and that most of the Greek and Latin authors also describe them, and which have been enlabeled so much by De Vigo, who especially praises vermillion, by means of which remedies Lemoyne had, Dionis says, acquired a considerable fortune, and which, according to Sabatier, other charlatans still made use of at Paris, even with full as much profit in the last century, are, however, at the present day totally proscribed. This does not arise from their being always ineffectual. Tents impregnated with sublimate, litharge, ægyptiac, lapis infernalis, filings of copper, arsenic, or precipitate and the actual cautery, which substances are still made use of by MM. Dieffenbach (*Kleinert's Repert.*, Sept., 1831, p. 81,) and Fingerhuth, (*Encycl. des Sc. Méd.*, 1836, p. 205,) together with discs of minium and a thousand other similar substances, are, on the contrary, of a nature calculated to cure a certain number of fistulas, whether by modifying the surface of the ulcerous passage, or by destroying the entire bridle which separates its two extremities; but the uncertainty of their action and the disadvantage of destroying sound parts we would wish to preserve, do not allow of our having recourse to them except where better methods are impracticable. Simple fistulas, or such as have but little depth, or where there is great timidity and an extreme repugnance to anything having the name of an operation, could alone, at the present day, justify their employment in certain cases. The method of Sabatier, which consisted in introducing the roll or tent impregnated with the caustics only in the direction of the bridle to be destroyed, that is, to the intestine, would then deserve the preference if our object was to effect a destruction of parts, and not to limit ourselves to a modification of the entire morbid surface by means of chemical cauterization.

B. *Ligature*.—The same remark nearly applies to the ligature, which, according to one of the books attributed to Hippocrates, was formerly constructed of five strands of thread surrounded with horse-hair, and which was passed from the fistula into the intestine by means of a probe, in the same way as with caustics and injections. At the present day it is but rarely made use of. At the time of Celsus they used a kind of packthread besmeared with some escharotic substance. Avicenna preferred twisted hairs or hog's bristles. G. de Salicet recommends, according to Sprengel, that we should

employ a small cord having knots upon it, for the purpose of cutting through the parts; while Guillemeau, who was an imitator of Paré, passed it into the rectum by the fistula and through a canula with a needle having a double cutting edge. Notwithstanding the arguments of Foubert, who substituted a leaden wire for the ordinary thread, and who, for the purpose of introducing it, contrived a probe in the form of a larding pin; of Kamper who returned to the ligatures of linen or silk thread; of J. F. Borsquet, who recommends that the leaden wire should be surrounded with lint and introduced by means of a needle; of Desault, who employed a directing sound, and afterwards a canula, like Paré, and then a leaden wire which he seized in the intestine with his finger or with his gorget forceps, in order to bring its extremity through the anus and to fasten it by means of a knot-tightener; of Flajani, who makes use only of a waxed hempen thread; and of the greater part of timid surgeons,—the apolonusis counts scarcely any more partisans among the practitioners of the present day. The advantages which are ascribed to it by its defenders, and which are more apparent than real, are counterbalanced by numerous inconveniences. Its action is extremely slow. The strangulation which it exercises causes sometimes a good deal of pain and nervous contractions, which are necessarily alarming. Complicated, multiple, and deep-seated fistulas would yield to it but rarely, while in the most simple cases it is far from being always found to answer. However, if any one should still be disposed to make trial of it, it would be a matter almost of indifference whether we made use of a strong cord of waxed thread or of silk, or a leaden wire, or one of fine silver, which, in the first case, is to be passed through the fistula by means of a flexible probe; and in the second case, along a grooved sound, or through the interior of a canula, and then brought to the outside by means of the left forefinger, which proceeds to search for it in the intestine in order to form a noose with it. The extremities are afterwards to be enclosed in the bullet knot-tightener of Riolan, that of Girauld, or what is better, M. Mayor's, or in the instrument of Desault, or twisted upon themselves if they are of a metallic nature. By taking the precaution to tighten them in proportion as the tissues yield, that is to say, every day or every two or three days, according as a greater or less degree of constriction is produced, we succeed in cutting through the entire bridle in the space of from twenty to thirty or forty days; so that at the moment when the ligature falls the fistula is usually found cicatrized. But how often are we obliged to remove it before it is time, in consequence of the pains which it causes, the tardiness of its operation, and the utter inability of the patients to endure it! In 1824 M. Bougon made trial of it at the hospital of Perfectionnement, on a courageous adult of excellent constitution. The patient kept it in for three weeks, complaining of more and more acute suffering every time it became necessary to increase the constriction. At this period the bridle, though it was of small length, was not half cut through, and as the pains went on increasing, it was deemed advisable to proceed to excision, which was attended with prompt success. When properly considered, the ligature, from its being applicable only to superficial and simple fistulas, ought to be laid aside.

and with so much the less regret because the methods which we then have as a substitute for it are generally attended with but little pain, and are applied with as much facility as certainty.

C. *Excentric compression*.—Surgeons, however, have not all yet abandoned the idea of curing anal fistula without a bloody operation. In these latter times there has been suggested a remedy which has the appearance of being even very ingenious, and the object of which is to dry up the ulcer by closing its internal orifice. The suggestion, which belongs I believe to M. Bermond, also occurred to M. Colombe. The first considers that his double canula with sheaths, applied in the manner described farther back, (see hemorrhoids,) would perfectly carry out the indication, and the second alleges that he has succeeded in keeping up in the anus a hollow ebony cylinder, retained outside by means of ribbons. It is a method which may be made trial of, but which experience has not yet sanctioned, and from which we must not anticipate too great a degree of benefit. In a patient in whom M. Colombe himself employed it, the mucous membrane of the rectum was invaginated into the upper opening of the compressing body, and occasioned acute pains. M. Piedagnel alleges that he has attained the success desired by fixing into the rectum a small sac filled with lint, in the same way as for the purpose of arresting a hemorrhage there. M. Montain, (*Thérap. Méd. Chir.*, p. 85,) even asserts that he has cured a number of fistulas at the anus by means of a compressing instrument, which had its point d'appui on the hip, and which was aided by cauterization. But all these modes appear to me of very doubtful efficacy. There is nothing, therefore, after strict analysis, but the cutting instrument, which can triumph with certainty over fistula in ano, and cure every form of it.

D. *Incision*.—The ancients, notwithstanding their predilection for caustics and the ligature, knew also however, that the best remedy for fistula in ano was incision. Hippocrates mentions this in express terms, and the *syringotome*, a kind of sickle-shaped bistoury, employed in the time of Galen, proves this satisfactorily. Leonidas, (Peyrilhe, *Hist. de la Chir.*, p. 442,) performed this operation with an instrument which terminated in a long flexible probe, and which was introduced through the fistula, and brought out through the intestine, in such manner as to divide the bridle with one cut. In the medieval epoch H. de Lucques first introduced a ligature, and then made use of it as a sound or probe to stretch the parts before incising them. Guy de Chauliac, who was always alarmed at the idea of hemorrhage, preferred a grooved sound on which he guided a bistoury heated to a white heat. F. ab Aquapendente, after having dilated the fistula with his speculum, merely used for making the incision, a blunt-pointed bistoury slightly concave, together with a sound. Others, as Spigel for example, proposed to sheath the syringotome in a silver, curved, blunt-pointed canula, which penetrating the first into the rectum was to be withdrawn from it by the finger, leaving a thread at the extremity of the bistoury in order to draw that at the same time by its point and handle, and to divide the fistula with one cut. It was Marchettis who suggested the idea of introducing a gorget into the anus, for receiving the point of the cutting instrument or of the sounds. Wisemann got along very well

without them, and made use of a scissors in place of the syringotome, which, however, did not prevent Felix from reviving the bistoury of Leonidas, which he modified by covering it with a coating in order to render its introduction less painful, and which instrument subsequently received the title of *royal* from the operation which was performed with it upon Louis XIV. J. L. Petit showed, that an ordinary bistoury slightly concave, and guided upon a grooved sound, was full as good as the instruments which had been extolled up to that period; and Runge gave as much security as possible to this process, by advising, like Marchettis, the use of a gorget, a gorget which Percy (*Mém. de l'Acad. Roy. de Méd.*, t. II., p. 1,) prefers should be of wood, rather than metal, and by using also a grooved sound, which two instruments were introduced, one into the intestine and one through the fistula, in such manner, that by means of a straight long bistoury with a thick point, destined to glide upon the sound, we could cut through all the parts comprised between them. Z. Platner considered that he could make an improvement in the mode of incision, by recommending that we should accomplish it by means of a concealed bistoury, which others commonly employed with the gorget. Pott, with a view of simplifying it still further, required nothing more than his curved blunt-pointed bistoury, which B. Bell replaced by a narrow bistoury terminated like the beak of a sound. The instrument of Pott was almost immediately modified by Savigny, who fixed upon one of its sides a pointed blade, which could be thrust out or drawn in at pleasure, and by T. Whately, who made its cutting edge movable, and arranged it in such manner as not to withdraw it until after having introduced the probe point of its blade into the rectum. In our times some persons, however, have revived this bistoury, the point of which Dorsey elongates into a cone, while A. Dubois makes the instrument advance upon a flexible grooved sound, which has been previously brought out of the anus through the intestine by means of the finger. The ancient probe bistoury of Leonidas revived by H. Bass, and afterwards by Brunel, is the instrument adopted by M. Larrey. In the way this last surgeon has modified it, it is no other than an ordinary straight bistoury, terminated by a long flexible blunt probe, which is pushed through the fistula and brought out by the anus, and which, requiring no director, divides with a single stroke the whole thickness of the bridle. Finally, M. Charrière has constructed one, the back of which is grooved in such manner, that it glides as well on a cylindrical stem as upon a grooved sound, so that the exploring probe which is ordinarily used becomes its conductor, and has no need of being replaced by the sound. Without denying the successful results ascribed to each of their numerous processes, we may at least maintain that there is nothing of any real utility to be preserved out of all this arsenal of instruments, but the wooden gorget of Percy, the grooved sound, the straight bistoury, and the bistoury of Pott, or that of M. Larrey, as in fact has been done by the moderns.

E. *Excision.*—Nor has the mode of performing excision always been the same. According to Celsus, we are to make an incision on each side of the fistula, he says, and then to remove all the parts which are thus circumscribed. Paul of Egina had recourse to the

ordinary syringotome, forceps, and bistoury. Some excised only all the movable wall of the fistula, after having embraced it in a noose of thread or raised it up with a forceps or sound, and to make the excision made use of either the straight or concave bistoury, or curved scissors, as was still preferred by G. Heuermann. Others were not satisfied until after having excised the whole fistula, either with one cut or by excising its two walls in succession. There are those who, after the wall of the fistula was destroyed, confined themselves to pure and simple scarifications of the callosities. At the present day, those who, like Boyer, adopt excision, begin by incising the fistula, and afterwards confine themselves to the removal of the divided flaps, (*des téguments décollés*,) which they seize with the forceps and excise with the bistoury.

F. *The manual of the operations for fistula.*—A purgative administered the evening before, if the state of the digestive organs allows of it, is required in order to prevent the necessity of too soon going to stool. “An injection,” says Dionis, “ought in fact to be given two hours before, in order that during the operation the surgeon may not incur the risk of having his face besmeared with ster-coral matters.”

I. The *articles required* consist of the particular kind of bistoury which is preferred, several ordinary bistouries, a pair of strong dissecting forceps, a grooved silver sound, and one of steel, without a cul de sac, a gorget of ebony or box-wood, straight scissors, and those that are curved flatwise, a number of cauteries, needles, and ligature threads, a long meche and meche-holder, tampons, and the hemostatic means elsewhere mentioned, (see Excision of Hemorrhoids,) small balls of lint, three or four plumasseaux, long compresses, square compresses doubled twice or four times, and a T bandage doubled.

II. The patient is laid upon the right side, when the fistula is on the right, and on the contrary, on his left side when it is on the left, in front, or behind, and doubles himself up, with his head lowered and his belly supported upon a transverse piece, while he stretches out the limb which is below, and flexes the other. An assistant situated in front of him prevents him from raising up his head, and watches his arms. The pelvis and the flexed leg are kept immovable by a second assistant. A third placed behind him, is charged with separating the buttocks, and of holding the gorget at the proper moment. Finally, there will be required a fourth, and even a fifth, to hold the other leg, to stretch the tissues, and to hand the instruments or cleanse the wound.

III. Before proceeding farther, *we search for the two openings* of the fistula. The discovery of the one outside cannot be attended with any great difficulty. The stercoral humidities, or the pus which escape from it, suffice, in the absence of a wound, to point out its seat, even though it should be at the centre of a hemorrhoidal tubercle, or in the bottom of some tegumentary duplicatures. It is not always the same with the internal opening. This last presents itself quite frequently at the middle of a small induration or pullet's rump, very readily distinguishable by the finger introduced into the rectum, or it appears under the form of quite a large ulcer, which may be recognized with still greater facility. Frequently it is not found

because we look for it too high up. It is sometimes so near the skin externally, that it requires attention, in order that we may not be deceived. It is only after having carefully explored all the strangled or straight portion of the intestine, that we should proceed to examine if it is not situated higher up. A flexible probe, moreover, will remove every doubt. We introduce it with the right hand through the cutaneous orifice, and with caution, in the direction of the fistula, and allow it to follow without effort the various tortuosities, so that its head will soon present itself to the finger of the left hand, which is waiting for it in the rectum. When there is but one external opening, this probe in general penetrates with a sufficient degree of facility, unless the fistula should turn round at too sharp angles in the course of its progress. When there are several passages, on the contrary, or numerous openings around the anus, the search sometimes is attended with a great deal of difficulty. We then introduce the probe into each of them in succession, proceeding in the manner just described. The failure of such explorations does not authorize us to conclude that there is no opening in the intestine. There are too many circumstances which may conceal it from the view of the operator. If some milk were retained above the anus, it would prove, if it issued through the outer orifice, that an inner one existed in the same way that if pushed through the outer the milk should be seen to return through the anus. Any other mild fluid of a strong color would serve the same purpose. It happens in other cases that the exploring instrument is found no longer separated from the forefinger except by a thin pellicle, like a sheet of paper, and yet notwithstanding it cannot be made to present itself naked in the intestine. It will glide with freedom in every direction without the slightest trouble. We perceive that the mucous membrane is attenuated and separated, and nevertheless still recognize that the end of the probe is outside the gut. Does an opening exist on some other point? or is it not rather an external blind fistula? it is impossible to say. A decisive step however must be taken. This state of things, which formerly was found very embarrassing, and which is still one of the most disagreeable for those surgeons who do not consider it proper to operate until after having explored the fistulous passage through both openings, does not, in the opinion of M. Roux, require so many precautions. This surgeon, in fact, affirms that the internal orifice of the fistula to be divided, is far from deserving the importance which is generally attached to it. Whether it exists or not, the remedy is the same. The décollement of the rectum is sufficient to justify the operation. Those minute researches, which occupied so much of the attention of the members of the Academy of Surgery, appear to him to be almost superfluous. As for myself, who, like M. Jacquier, (communicated by the author, 1839,) have seen the disease persist in patients operated upon after the precepts of M. Roux, and who, on the other hand, am aware of the successes obtained from this method by M. Bégin, I am of opinion, that without neglecting those means required to ascertain if the ulcer opens into the intestine, we should nevertheless operate, when we do not find it, if the disease should continue to persist for some months, and that the rectum has undergone décollement to a certain extent. If

however the opening shall have been found, and is not situated very high up, the silver sound is immediately to be substituted for the probe. We proceed with the forefinger to search for it in the rectum, seize its point, and, after depressing and curving it a little, bring it out by the anus, while at the same time the surgeon continues to urge it along the fistula with his right hand. A simple strait bistoury, such as that employed by M. Richerand, M. Ribes, and Sabatier, and as is recommended by Dupuytren, and which I have several times myself made use of, or Pott's curved bistoury, or Dorsey's, with a conical point, or the slightly concave bistoury of J. L. Petit, being then guided upon the groove of a sound, the extremity of which is steadied by an assistant, divides through the whole bridle with a single cut, making the operation one of extreme simplicity.

IV. *When the fistula is higher up*, or the décollement has extended very far, it is better to imitate Boyer and M. Roux, by making use of a steel director with an extremity somewhat pointed. It is introduced as high as to the upper part of the fistula. A gorget is then to be substituted for the finger, which last in the rectum had followed all the movements of the sound, and now presents to it the gutter of the gorget. The director is to be pushed against the gorget in such manner as to pierce through the intestine. By moving them backwards and forwards so that they rub against each other, we satisfy ourselves that they are in actual contact. At this stage the assistant seizes the handle of the gorget, fixes it, and reverses it a little to the outside, as if for the purpose of vibrating it. The surgeon, with his left hand, acts in the same manner on the plate of the director; seizes a bistoury with a strong point with his right hand; fixes its point into the conducting groove; pushes it quickly up to the gorget; and withdraws it by elevating his wrist and without allowing it to abandon the point d'appui which he has given to it. For fear the whole of the bridle may not have been divided, the bistoury is to be reintroduced a second and even a third time upon the director; after which, in order to be certain that we have left nothing, we withdraw the two auxiliary instruments as if they were a single instrument, and without separating them. *Should there remain a cul de sac above*, we should immediately proceed to lay it open by dividing, by means of the scissors guided upon the finger, the abnormal valve which forms it. The cutting edge of the bistoury turned to the outside, is then to be directed upon the bottom of the wound, which latter it incises or scarifies to a moderate extent throughout its whole length, and afterwards prolongs it, at the expense of the skin, to the distance of about half an inch or an inch upon the buttock. However little décollement or attenuation of the integuments may have taken place, they are to be incised by a crucial incision or a T incision reversed, after which each of the flaps is to be seized with a forceps and cut off at their base from their free surface to the wound, by means of a bistoury. Without this precaution the suppuration would be interminable and a cure rendered very uncertain. The pain that it causes and the time that it requires, are nothing in proportion to the advantages that result from it. Prudence does not permit us to dispense with it except in the cases of those fistulas which are wholly of a simple character. What we have done on the first fistula we repeat

on the others, in order that we may reunite them at the wound of the rectum. All the tegumentary flaps which are thus formed are also to be excised, however little they may be altered or attenuated. The same bistoury, or the probe-pointed one, and always to be conducted upon the finger, is to be made to act in the last place upon the different bridles and valves which are met with at the bottom of the openings or of the wound, in order, before we terminate, that we may regularize, as perfectly as possible, the whole interior of the bleeding surface, after which the operation is finished.

G. *The dressing* is the same as for fissure at the anus, except that the meche should be larger. It is important, after having introduced it, to separate a bundle of fibres from it to place between the lips of the wound, beyond which latter it should pass up to the distance of an inch or two. A sufficient quantity of coarse lint and plumasseaux laid over this fill up the margin of the anus. The whole is then to be covered over with two or three square compresses and afterwards by as many long compresses, which are to have some degree of width. The two heads of the T bandage previously fixed around the belly, then brought down over these different portions of dressing, passed between the thighs, and then crossed and brought in front, one to the right and the other to the left, and afterwards knotted or fastened with pins upon the hypogastric circular, complete the dressing.

H. *Accidents.*—Hemorrhage, should it occur, is to be treated in the same way as after excision of hemorrhoidal tumors. If the artery which bleeds can be seen, it is to be surrounded with a thread, unless we should prefer torsion. In the contrary case we introduce the pulp of the finger into the bottom of the wound, in order to compress in succession all the different points of it. As soon as we arrive by chance upon the vessel, the blood ceases to flow. This is the point consequently upon which we must apply the small balls of lint, charged or not with hemostatic powders or liquids. The meche and other portions of dressing are afterwards adjusted as above described. Should we not succeed, and that the tamponing also of the whole bleeding surface does not prove sufficient, we have no other resource than to choose between the actual cautery, Levret's bladder, Bleagny's gizzard, the tampons of J. L. Petit, adopted by Boyer, or the apparatus of M. Bermond; but it rarely happens that we are reduced to this necessity, and so much the less so inasmuch as the hemorrhage, which sometimes follows the operation for fistula, is useful rather than injurious, and that in almost in all cases it ceases spontaneously before it has become alarming.

I. *Remarks.*—The exclusive partisans of incision do not always proceed precisely in the manner which has been described. The décollement (denudation) of the rectum is not, in their opinion, a reason for prolonging its incision above the fistula. They maintain that after the operation the intestinal wall will attach itself and soon become agglutinated on its outside to the suppurating surface; that so also its cutaneous flaps and indurations do not fail to re-agglutinate or disappear, as soon as the bottom of the fistula has become continuous with the anus, without any interposing impediment, and consists of nothing more than a mere notch or gutter in the intestine;

that we in this manner abridge the length of the operation, and much of the sufferings of the patient, and also the continuance of the suppuration and the period of the cure : that we have less reason to apprehend hemorrhage and fever, and that less deformity results from the operation ; finally, that the important point is to interrupt the continuity of the sphincter, which, by retaining the faecal matters, obliges them to penetrate in part into the fistulous passages. The objections to be made against this reasoning are, that if the denuded and attenuated parts may, in fact, ultimately become re-agglutinated after a simple incision, in a considerable number of patients, so is it not uncommon to find the contrary take place. Moreover, how could it be otherwise ? We see here nothing more than is remarked every day, on every other region of the body. There is nobody at the present time who has any doubt, that the excision of the livid and attenuated flaps which cover the bottom of a great number of interminable cutaneous ulcers is the best remedy that can be opposed to them. The section of the sphincter does not always take place ; moreover, it is not this muscle, but in fact, the fibro-muscular circle situated above it which forms the most contracted part of the anus. After all, what have we to fear ? A loss of substance in the midst of such soft parts is soon repaired. The pain is less acute than is generally supposed. By the very fact itself that the tissues are attenuated and, as it were, dissected, they cannot contain vessels of large calibre. Difficulties there are none, for those who know how to handle the bistoury. In a few seconds all the flaps have been seized and extirpated. The patient, resigned to the operation, prefers suffering a little more, in order to have all the chances possible of being cured with certainty and rapidity. On the other hand, we do not perform this excision except in fistulas that are accompanied with a very marked degree of décollement. The division, in fine, scarcely falls upon anything else than the skin, and the whole is limited to a pure and simple incision when the passage to be destroyed is not surrounded by any disorganization. In a word, the indication to be fulfilled in these cases presents itself under two points of view : first, to dry up the source of the fistula by incising the rectum ; and secondly, to place the wound afterwards under such conditions that its cicatrization may be accomplished with facility.

I. *Those fistulas which open upon the anterior wall of the intestine,* exact somewhat more precaution than the others. Their excision should not be attempted without some very evident necessity. The bistoury introduced into the bottom of these for the purpose of scarifying them, could reach too quickly into the bladder and peritoneal cul de sac, or upon the prostate, to make it allowable for us to expose ourselves to this risk. When they are very high up, no matter in what direction, the operation is at the same time more difficult and more dangerous ; not that we have seriously to fear wounding the peritoneum, even though the fistula should be as high up as the sacrum. Practitioners who have pointed out this danger, had doubtless forgotten that the morbid opening perforates only through the mucous and muscular membrane, without implicating the serous tunic ; that the pus is effused into the cellular tissue and not into the cavity of the abdomen ; that if the peritoneum was ulcerated there would be

an effusion into the belly, and a disease almost inevitably fatal, or at least, one too serious to think of an operation ; and that the bistoury, from its not leaving the groove of the director which has been selected, cannot, scarcely by any possibility, reach the peritoneum, even though the surgeon had that intention, and that the lesion of this membrane is not, if all things are well considered, more to be dreaded above than below, or in front or behind the intestine. The danger arises from the fact that we may incise beyond the lower limits of the ischio-rectal aponeurosis, or, in truth, of the internal border of the pelvic aponeurosis, and which would expose to the risk of purulent filtrations between those two layers in the first place, and afterwards into the pelvis between the peritoneum and the *fascia pelvica*.

II. What precedes is to be understood only of those fistulas in the anus which are kept up exclusively by some *local affection*, or by the destruction of the cellular tissue, or the perforation of the rectum. Those which depend upon a caries, a necrosis, or any alteration whatever of the ischium, coccyx, sacrum, or vertebræ, and the source of which lies in a deep-seated suppuration in the abdomen or chest, are purely symptomatic, and the cure of which cannot be thought of until their cause has been removed. When they are complicated with syphilis or any morbid diathesis, we must at least, should we decide upon operating, subject the patient at the same time to the particular or general treatment required by the nature of the affection. It is from having proceeded in a contrary manner that certain operators have found the wound continue open to an indefinite period, and the suppuration resist every attempt to dry it up, though there may have been no circumstance nor any anatomical alteration which could interfere with its cicatrization.

III. Experience proscribes the performance of the operation *in consumptive patients* : 1st, because in most instances the fistula moderates the progress of the pulmonary disease ; 2d, because it is usually caused by the ulceration of one of the thousand tubercles with which all the organs are then cribbled ; 3d, because the wound rarely heals up, but suppurates abundantly and reacts in an injurious manner upon the ensemble of the organism ; and 4th, because, if by chance it closes up, it is remarked that the pulmonary affection, which was momentarily suspended, rarely fails to become thereby aggravated. This however is not an argument for creating a complete artificial fistula in the anus of tuberculous patients, by introducing into the rectum a long darde inclosed in a large canula, from whence it may escape when we wish, in such manner as to traverse the intestine from within outwards and from above downwards, so as to come out at the margin of the anus, while dragging after it a seton destined to remain in the wound, as has been proposed, and in one instance practised by M. Heurteloup, at La Charité. Nothing more can be hoped for from a resource of this kind than from a seton at the nape or a blister on the arm. I am of opinion even that in certain cases, a fistula at the anus may co-operate from the pus which it furnishes to the general circulation, in the production of tubercles, and in creating a pulmonary diathesis, instead of being a remedy for it.

IV. The little frequency of *internal blind fistulas* is owing to two causes : 1st, because they are speedily transformed into complete

fistulas; and 2d, because in the contrary case the ulceration is sufficiently moderate to allow of their spontaneous cure. This is what I saw happen in a patient in whom I was obliged to lay open, through the interior of the rectum, an extremely painful abscess, which it was impossible to recognize externally, and which made a decided projection into the intestine, and from which there escaped more than a tumbler full of pus. Moreover, to operate upon fistulas of this kind, we endeavor to transform them into complete fistulas, either by retaining the pus in their interior by means of a tampon introduced over their opening, or by a stem curved into a hook and passed through the anus, with its short branch lodged in the ulcer. These resources enable us to ascertain the point on the perineum which corresponds with the fistula, and thus to lay it open with a cut of the bistoury. Moreover, when the intestinal orifice has once been discovered, it is not necessary to have recourse to so many means of exploration. The bistoury introduced flatwise upon the finger and having a small ball of wax on its point, would succeed perfectly well, by incising the rectal wall of the fistula from above downwards and from within outwards, in the same way as if it were an ordinary abscess, and in such manner as to divide through the sphincter, should that be deemed advisable.

V. As to the question whether it would be proper to operate for the fistula with the same cut which lays open the stercoral abscesses, as was recommended by Faget, or whether it would not be preferable to make a puncture only at first and to operate subsequently, as Foubert has advised, opinions at the present day have unanimously determined in favor of this last mentioned author: 1st, because the introduction of the finger or gorget would then occasion too much pain; 2d, because, from our not being able to ascertain where the opening is nor to what point the decollement has extended, it would become necessary in most cases to repeat the operation after the expiration of a certain period of time; and 3d, because many of these abscesses, when they are once laid open heal up without any other operation, which Foubert had already noticed, as is shown also by several cases which I have published, and other instances of which I have since met with. To operate upon multiple fistulas at several times, and at intervals of several days, as was done by Fichet de Flechy, (*Dict. de Méd.*, 2d ed., t. III., p. 38,) and as others have since proposed, would not be advisable except it were impossible to find their various orifices on the first day. I have elsewhere, (*France Médicale*, t. I., pp. 57, 61, 73, 78,) mentioned the special circumstances connected with fistula in ano in women.

VI. The *subsequent dressings* is a point of great importance after the operation for fistula in ano. Almost all French surgeons maintain that a large meche should be constantly kept up in the rectum, or that there should be at least always a portion of it kept between the lips of the wound. Unless that were done the cicatrization, they say, would first take place upon the mucous membrane, and the fistula be thereby reproduced. The cure cannot be complete and permanent unless it proceeds from the bottom to the borders of the wound. A patient who was doing very well, was temporarily left by Sabatier, who ascertained at the end of three weeks, that the fis-

tula had formed again, when it was found that the assistant to whom he had entrusted the care of the meche, had not employed it in a proper manner. The incision was then repeated. Each dressing was performed by Sabatier himself with the greatest care, and this time the disease entirely disappeared. Boyer holds precisely the same language, and relates facts that are exactly similar. Pouteau, nevertheless, who contended zealously against this doctrine, affirms while he supports himself also upon the facts which experience has furnished, that the meche is not only useless but even injurious, from the irritation and compression which it causes upon the bleeding surface, which latter, according to him, requires no other treatment than that of simple wounds, which we wish to take on suppuration. In England the principles of Pouteau are universally adopted. A strip of fine linen or some strands of lint is all that is allowed to be placed between the borders of the wound, and M. S. Cooper among others, is unable to comprehend what he denominates the French practice. On this point, as on so many others, we may, I think, readily furnish an explanation. It is not probable that the same differences in this respect exist in practice as is found in books. The object is to prevent the reagglutination of the lips of the wound before we have modified its bottom, and forced it, in fine, to become cicatrized by degrees, from its sides towards its deepest portions. To effect this, what have we to do? A slender meche would not always answer, because in most cases it would be found to be expelled by the wound of the anus itself. On the other hand the large cylinder of thread which is used among us is not indispensable, for we may with a meche, which is more supple and smaller, keep the solution of continuity sufficiently open. It has moreover the positive inconvenience when it is persisted in for too long a time, of flattening down the cellular granulations, whose development also it interferes with. Reasoning and experience concur in showing that a meche of medium volume is advantageous during the ten or fifteen first days, that we may afterwards without any disadvantage make it gradually smaller and smaller, and that it is advisable to dress flatwise with soft lint as soon as the traumatic surface is of a vermillion color and appears to be disposed to cicatrize. As to the rest, this wound is to be treated like any other, which remark applies also to the various accidents local or general which may take place during the progress of the cure.

#### ARTICLE IX.—CANCERS OF THE ANUS.

No part is more liable to lardaceous, and even cancerous degenerescences, than the termination of the rectum. They present themselves here sometimes under the form of tumors, which are more or less projecting, and with a base of greater or less width; sometimes with the appearances of a perforated diaphragm, especially when it is the valve described by M. Houston, (*Dublin Hosp. Reports*, p. 162,) which constitutes their seat; and at other times, under the aspect of plates, which are more or less extensive, either in height, thickness, or breadth, and which sometimes occupy the entire contour of the organ. When topical applications, debridements, and

compression, have proved insufficient, and that the disease continues to progress, we have to apprehend, whether it be cancerous or not, that it will terminate fatally, unless we resist it by more efficacious remedies.

### § I.

*Extirpation* is a last refuge towards which the mind then naturally turns. This suggestion has occurred to various persons who have ultimately recoiled from the operation, or become alarmed with the difficulties attending its performance. Desault does not consider extirpation admissible, but for those tumors which are of a bad character, perfectly defined and movable, and the various prolongations of which may be reached without any difficulty. Boyer is of the same opinion. All the school of the ancient Academy of Surgery adopted this principle, which originated with Morgagni. The surgeon who ventured to make trial of it at the time of Morgagni, was unable to finish the operation; and Béclard, who, according to M. Paris, maintained in his course of operative surgery at La Pitié, in 1822 and 1823, that at the improved state to which surgery had then arrived, schirrous indurations of the rectum ought no longer to be considered necessarily mortal, and that we ought to remove the altered parts while adopting all the precautions required by the proximity of the bladder, and numerous vessels which surround the lower extremity of the intestine, had not an opportunity of putting this process into practice. It was Faget who appears to have been the first who successfully performed this operation, viz., on 9th June, 1739, in presence of Boudou and his brother. He excised about an inch and a half of the whole circumference of the rectum. What chiefly struck his attention was, that the stools could be made with the new anus in the same way as they had been made before the operation, although almost the entire sphincter or plane of circular fibres which surround the anal opening had been excised. After having endeavored to explain the formation of a new constricting muscle, and the mode by which M. Gelé, his patient, was enabled to retain both solid and liquid matters, and even air, Faget came to the conclusion that extirpation of the anus, even at a very considerable height, was a practicable operation. M. Lisfranc has furnished the proof of this. His first patient, who was operated upon on the 13th of Feb., 1826, found himself, it is said, completely restored on the 13th of April following. He obtained a similar success in the month of January, 1828, in a woman, and afterwards a third, in another woman operated upon the 15th of July, and cured the 28th of October of the same year. In a fourth patient, the cure remained doubtful, and the fifth died on the 10th of March, 1829. 4 days after the operation, from a suppuration in the pelvis, and probably with a phlebitis. A sixth, who was a man 72 years of age, succumbed on the following day, but the body could not be examined. His seventh patient died at the expiration of 25 days, and also had pus in the pelvis and veins. But the thesis of M. Pinault, which contains all these facts, also gives two instances of cure; by which it would appear, that up to the month of August, 1829, M. Lisfranc, out of nine operations of this description, counted five successful results, one of partial success, and three deaths,

if we may be allowed to accord an entire degree of confidence to the facts derived from the practice of this surgeon.

A. *The ordinary process.*—The patient being arranged, and placed, and held in the same manner as for fistula, except that his two thighs, and not one only, are to be separated by a pillow, and bent at a right angle upon the trunk, while an assistant keeps open the buttocks and stretches the skin, the surgeon encircles the diseased part below by means of two semilunar incisions, which unite at the coccyx and perineum, so as to form an ellipse; dissects this ellipse on its outer side from below upwards, and to the right, and then to the left; detaches it by degrees from the surrounding tissues, while taking care to leave nothing altered external to it; stops when he arrives at the sphincter; introduces the left forefinger into the anus; makes use of it as a hook to depress the scirrhouus ring, which latter he endeavors to bring to the outside at the same time that an assistant makes traction upon the dissected ellipse; retakes the bistoury in his right hand, and continues to cut in a circular direction the adhesions which exist between this portion and the circumjacent layers, as far as to above the limits of the disease, if it is possible, and terminates the operation by detaching the whole by free strokes with the scissors curved, flatwise, or even by means of the bistoury which he has made use of up to this time.

I. When *the cancer is deeper*, and more adherent, or comprises a greater thickness of the tissues, M. Lisfranc divides vertically the angle or posterior wall of the dissected ellipse, by commencing with a strong pair of scissors and prolonging his incision to a point sufficiently high in the rectum. The assistants afterwards make traction upon the remainder of the circle by means of ergines or strong forceps, while the operator prolongs the dissection above as far as possible, by means of the bistoury guided upon the finger, introduced in the anus, and by the thumb applied upon the outer side of the flap. When he has gone beyond the limits of the disease the curved scissors may be substituted for the bistoury as before, in order to separate, circularly, the dissected mass from the portion of the rectum which is to remain. We introduce its extremity into the posterior incision, in order to embrace in succession its two halves, and to divide them from behind forwards, while taking care to act on the sound tissues, and to increase our precautions as we approach the genito-urinary organs.

II. In *women* an intelligent assistant, with one or two fingers introduced into the vagina, watches the movements of the bistoury or scissors in this direction, while the surgeon dissects the cancer in front, or endeavors to excise it at its depth. In man the urethra, prostate and bladder render this stage of the operation still more delicate. A strong catheter, kept up the natural passage, is doubtless a valuable guide, but one which would be but of feeble assistance if the surgeon had not constantly present before his mind his knowledge of the surgical anatomy which relates to the perineum, or if he were unpractised in the employment of cutting instruments.

III. *When the excision is finished*, the operator reapplies his finger upon every point of the wound. If he perceives any tubercles, flaps, or remnants of altered tissues which have escaped him, he imme-

diately seizes them with an erigene or a forceps, and instantly excises them with the bistoury or scissors, whether they be in the interior or on the skin. The arteries divided belong to the same branches as in the operation of fistula in ano. To these must be added, in some cases, the transverse artery and the superficial arteries of the perineum. The ligature is to be applied upon all those which can be seen, in proportion as we divide them. Otherwise we should run so much the greater risk of not finding them afterwards, because from being stretched and elongated at the moment of making the section, they ascend very high up into the pelvis, and, if we wish to bring them to the outside by making traction upon the extremity of the intestine, the compression we exercise upon them prevents the blood escaping from their mouths. Nevertheless they are rarely of sufficient size to give rise to the apprehension of any serious hemorrhage. Should this hemorrhage have taken place we combat it by refrigerants, styptics, small balls of lint methodically applied, tamponing, or in a word, by one of the methods pointed out in the preceding articles. If during the course of the operation the blood should flow to such extent as to interfere with the surgeon, we might, as, according to M. Pinault, M. Lisfranc directs, wait a few moments and check it with lint saturated with cold water, should it not be practicable to have recourse to the ligature or torsion.

IV. The *meche* is still more important after this operation than in any of the others. It should be of large size and long. It is requisite that the finger should precede it and incline it strongly backwards in order to find the new opening of the rectum, and that it should afterwards make it vibrate in the contrary direction in order that it may penetrate with facility. A portion of linen besmeared or covered with cerate and applied over the bleeding surface, then receives the extremity of the meche, over which we place coarse lint, several plumasseaux and compresses, and the double T bandage.

V. When we omit the meche in the beginning, and limit ourselves to spreading upon the wound the perforated linen which is to receive the lint, so as not to have recourse to tents until at the tenth or fifteenth day, the first dressing becomes more prompt and is perhaps a little more easy; but we create for ourselves difficulties in perspective, so that it would be more rational to proceed in the manner I have just pointed out.

VI. The wound, which is inundated for some days with a copious suppuration of a grey and blackish color, mingled with faecal matters, becomes cleansed by degrees, and begins to contract from the fifteenth to the twentieth day. At the same time that the skin is being, as it were, dragged in towards the pelvis, the intestinal orifice reagglutinated to the parts which surround it, approximates to the exterior; so that finally nothing more remains than an annular loss of substance to the height of an inch or even less; and that the preserved fibres of the levator ani, of the aponeuroses and termination of the rectum, and of the other lamellæ, by being blended together in one ring reproduce, to a certain extent, the sphincter muscle, supposing it should have been necessary to have removed this, leaving in this manner after the cure, infinitely less deformity than could have been at first anticipated.

VII. In order that this cure may be certain and permanent, it is important not to abandon suddenly the use of dilating bodies. The new anus has so great a tendency to contract, (*coarctate*), that if the meches were not continued at least for some weeks after the cicatrization of the wound, and renewed from time to time, during the space of several months, the greater number of patients would not fail to become soon affected with so great a degree of contraction as to counterbalance the price of the sufferings they have endured and the benefits of the operation, though it may have been performed in the most judicious manner.

B. *New process.*—If the cancer constitutes a ring which is only an inch in height, I commence by laying it open behind. Afterwards, securing it with the finger or a good pair of erigines, I bring it down completely to the outside. A curved needle then enables me to pass through its root a series of threads from above downwards, or from the rectum towards the skin. The cancer being now detached from the sound parts by means of a circular incision, either from the skin towards the mucous tissue, or from the latter towards the former, by means of the bistoury or scissors, is immediately removed at three or four lines on this side of each point traversed by the threads. By seizing these latter, in order to knot them outside, we approximate and place in contact the two circles of the wound, in such manner as to accomplish their union by first intention. When the disease goes higher up, I first dissect it from below upwards as in the ordinary process, and even to a certain distance beyond. It is at this moment that I insert the threads from space to space upon the sound portion of the detached rectum, and above the altered tissue, as if for the purpose of securing it, and afterwards from above downwards through the cutaneous lip of the wound. A few cuts with the scissors or bistoury immediately cause the cancer to become separated, and the approximation of the two halves of each thread afterwards brings down without any difficulty the intestinal circle, preserved, as far as to a line with the tegumentary circle. Should it become necessary to remove unequal plates instead of a complete ring from the anus, we might circumscribe each of them in an ellipse, the two lateral angles, and the lower angle of which should be immediately reunited, and each closed by two points of suture. These three modifications of the process have been used by me in practice. From their enabling us to fill up the wound with mucous or cutaneous tissue, and by first intention, they render the occurrence of hemorrhage more difficult, the cure more prompt, and the reaction less serious, without at the same time leaving any inodular cicatrices.

#### § II.—*Appreciation.*

Cancer of the anus, therefore, may be submitted to the chances of extirpation, like that of the breast, when without causing too great a destruction of parts, it would appear to be practicable to remove it entire, that is to say, when we may reach completely beyond it with the finger, and when it is limited to the walls of the intestine, or at least retains a certain degree of mobility, and has not yet extended beyond its line of demarcation with the constituent parts of the is-

chio-rectal excavations. In other cases, and in all those in which its adhesions with the vagina, bladder, prostate, or urethra, shall be found to be too intimate to be destroyed with facility, it will be advisable to renounce it in the same way as we should do also in any other region. The patient operated upon by M. Ricord, (*Journ. Hebd.*, t. XI., p. 534,) died in consequence of it; while those of M. V. Mott were perfectly restored. It was a cancerous tumor of the rectum, and not the anus itself which was successfully extirpated by M. Torri, (*Sul. le Extirpazz. di un Cancero, &c.*, Bologna, 1837.) We cannot very clearly understand what the disease was in the patient whom M. Stirling, (*Transact. Méd.*, 1833, t. II., p. 349,) states that he cured. M. Mandt, (*Rev. Méd.*, 1836, t. III., p. 264—*Kleinert's Repert.*, Jan., 1836,) in one case had a recto-vaginal fistula. M. Baumès, (*Bull. de l' Acad. Roy. de Méd.*, t. I., p. 936,) asserts that he has completely succeeded with this operation. The same remark applies to M. Maurin, (*Rev. Méd.*, 1831, t. I., p. 194.) In the patient of M. Haime, the incontinence of the faecal matters persisted. Of the six patients operated upon by me, one died of phlebitis at the expiration of ten days, a second from exhaustion on the seventh day, a third with a pound of blood effused into the upper part of the rectum, while the fourth and fifth were radically cured. The sixth cannot retain his fæces, and is at the present day, (1839,) which is three years since the operation, in a state approaching to marasmus.

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### [CONCLUDING REMARKS,

BY V. MOTTO.

In regard to *spina bifida*, to which allusion has been made in a note in the last volume, [see Supplemental Appendix, Vol. II., p. 99,] a remarkable case has recently presented itself in my practice. Its locality was very unusual, that is, in the lower part of the cervical vertebræ, and upper dorsal, in a female child aged nine days. The tumor was congenital and globular, about one and a half inches in diameter, and attached by a narrow pedicle, about half an inch diameter, between the spinous processes. It was said to have diminished slightly since the child's birth, and evidently contained a limpid fluid. There was no deficiency or defect of development in the median line between the spinous processes, where it was situated. Pressure on the tumor produced no effect on the child, which was otherwise perfectly healthy and well formed. No fluctuation could be produced by pressing the fontanelles and tumor alternately. It was, however, believed to have a communication with the cavity of the spine, and with the consent of the parents, its extirpation was determined upon. This I accordingly did on the following day, when a communication, about the size of a crow-quill, was found leading into the cavity of the spinal marrow. The tumor contained the fluid of an ordinary spina bifida. An elliptical incision was made

on each side of the tumor into the sound portion of the integuments, and the mass extirpated at its root. The lips of the wound were closed, as in hare-lip, by two interrupted sutures, aided by adhesive plaster. The plaster was renewed twice in the course of ten days, at the expiration of which period the wound was found perfectly healed.

**IMMOBILITY OF THE LOWER JAW.**—This malady, as far as I know, has never formed a distinct chapter in any systematic work on surgery. I therefore, perhaps, may claim some originality for introducing it to the notice of the profession. The more so, from my having for the last thirty years and upwards, met with many cases of this kind and treated them successfully. The means which I have resorted to, may possibly have been used by others before my time, but I am not aware of the fact. We are sure that many of the cases we have met with, had been abandoned by others as altogether hopeless and irremediable.

All surgeons no doubt would, or ought to think of expedients to relieve difficulties and embarrassments connected with the full and normal functions of organs. But as this subject has not claimed that share of attention which its importance demands, we think no apology on our part need be offered for here introducing it in a distinct article. And we know of no epithet more appropriate to the affection, than that which is implied by the name we have given to it. It is, in our opinion, an important surgical subject, and especially so, as it is one which frequently is very difficult to treat. The difficulty in this affection depends, according to my observation, upon three different causes.

*First.*—The first and most frequent cause is the formation of firm unyielding cicatrices, resembling as it were *adventitious ligaments*, connecting the upper and the lower jaw bones, in such a way as utterly to prevent any downward movement of the lower jaw; which *fastenings*, if they have continued for a number of years, as we have seen in several instances, create a positive deformity in the configuration and symmetrical proportions of the features of the face. As, for example, in the remarkable disproportion in the development of the chin and the entire lower jaw bone, as compared with the rest of the face. And from the long continued fixedness of the lower jaw bone, we find that besides this outward deformity, the front teeth also frequently present, especially in the cases of long standing, an irregularity, and also a disproportion, which is utterly *un-human* in appearance. When not opposed to each other, they grow to an inordinate length, and exhibit a *carnivorous* or canine aspect, as though they were intended *exclusively* for tearing purposes, instead of fulfilling the functions of incisors.

*Second.*—The second cause appears to lie in the muscles themselves, in the form of a preternatural rigidity or dynamic contraction, as is evident to the sight as well as to the touch. Most of the cases I have seen and treated of this description, have been young persons, in whom the disease was the result of the violent action of mercury upon the mouth and adjacent parts, exhibited for some form of fever, for scarlatina, &c. I have traced these cases to that cause, though it is difficult to understand how such an effect

should be produced by it ; unless it is from the unwillingness in the individual to exercise the muscles of the lower jaw, while in the engorged condition which exists in the tissues during mercurial action ; the muscles from this quiescent state seeming by degrees to take on an unnatural spastic rigidity. In all the cases but one which we have encountered, there was more or less of a normal action in the pterygoid muscles, by which a trifling lateral movement of the lower jaw was perceptible. In the case in which none of these movements could in any way be detected, all my efforts, which were varied and very powerful, were utterly unavailing in opening the mouth ; as will be seen in the details farther on.

*Third.*—It may be proper to enumerate a third cause. This, according to recent pathological observations, as is seen in a note in the text, has been found to consist in an *osseous union*, by means of a bony plate which extended from the coronoid process to the superior maxillary bone, by which the lower jaw became perfectly immovable. These, we hope, are rare instances, but it is possible that the irremediable case we have above alluded to, may have been rendered incurable by such an adventitious formation. If such a condition of things could be known at the time, probably some sort of an operation might be devised to sever or exsect this bony communication, and thereby at once open the jaws. In all my cases but one, even though there was not any appreciable movement of the jaw downwards, I have been enabled to ascertain by a careful examination, that there still existed some trifling lateral motion. As far as my experience has gone, I would therefore consider this as the best *diagnostic* or test for justifying the process of opening the jaws which I have adopted so frequently with success. Indeed, I should be unwilling to offer a favorable opinion of the result of the operation, without this previous evidence of the natural condition of the articulating surfaces. My process of surgical treatment for the relief of this distressing difficulty, will be better understood by the details of the following cases ; by which it will be found, that almost every case has had some peculiarity which has made it necessary to vary the steps of the operation. The instrument upon which I have relied, after preparing the patient by the necessary previous incisions, is constructed upon the *screw and lever* principle. It is one which I got up to meet the exigencies of the third case, without ever having seen or heard of any thing of the kind. Though I confess I have since met in the *Armamentarium Chirurgicum* of Scultetus, the figure of one of a similar construction.

*CASE I.*—The first case occurred about the year 1812, in a little girl. There was extensive exfoliation of all the alveolar margin on the upper jaw on both sides. The lower jaw was quite firmly fixed. After removing the necrosis, and waiting until the gum healed, the cicatrices were then freely divided from within the mouth. Then, by forcibly seizing hold of the chin and side of the jaw with both my hands, and putting my thumbs on the teeth of the lower jaw through the opening made by the removal of the necrosis, while the head was very firmly held, I succeeded in depressing the lower jaw so as to open it sufficiently wide. The little girl was about nine years old, and of good healthy constitution, and the disease was

produced by the action of mercury given for a remittent fever. She entirely recovered the use of her jaw by the process mentioned.

CASE II.—The second case was an officer of the U. S. army, from Green Bay. His lower jaw was almost immovable from a cicatrix extending from the last molar tooth, to some distance forward. It had been of several months' duration, and was, I think, also the result of mercurial action. The cicatrix was divided with a scalpel, and the jaw forcibly depressed at the chin, by which means the mouth was opened, and the cure was perfect.

CASE III.—During the winter of 1828, a young man about 21 years of age, from North Carolina, called upon me with the lower jaw almost immovably fixed to the upper. There was not the least motion to be discovered in a downward direction, nor was the most powerful effort with the hand upon the chin, able in the slightest degree to alter its situation.

He had been in this deplorable state for between ten and eleven years. Unable during that time to chew a mouthful of food, he introduced all the solid aliment which passed into his stomach through an opening on the right side, occasioned by a small aperture from an irregularity of the bicuspid teeth.

On the left side, just within the angle of the mouth, and opposite the situation of the cuspidatus tooth, a very firm band was to be seen and felt, reaching from this point along the alveolar ridge to the coronoid process. It was of more than ligamentous hardness.

Along the whole course of this adhesion of the cheek to the gum of the lower jaw, there was not the vestige of a tooth; and he stated that from this part a large piece of the jaw had been formerly separated with the teeth attached to it. This morbid adhesion had been several times freely divided, but no depression of the lower jaw could be effected. It was cut from within the mouth in different directions, but never allowed the least motion to the jaw.

From his being able to give a little lateral motion to the lower jaw, I felt encouraged to hope, that some relief might be afforded him, and that his mouth, by some powerful efforts, might yet be opened. He consented with great cheerfulness to any operation which I thought could be performed, to enable him to receive food with more satisfaction, and restore the power of speaking, which was also very much impaired. If this could be accomplished, it would, moreover, very much improve his expression generally, as his face had become very much contracted and misshapen.

Seated in a chair, I made an incision from the angle of the mouth on the left side, through the cheek, and carried it to near the edge of the coronoid process, dividing the firm cicatrix within completely. Then cut the adhesion freely from the upper and lower jaws, so as to relieve the jaws entirely from all restraint from that cause. A piece of very broad tape was now conveyed between the teeth by means of a probe and spatula, and tied some distance below the chin. The head was now firmly held, and with all the force I could exert in the loop of this tape, not the least yielding of the lower jaw could be discovered.

As no force which I could exert would enable me to open the mouth, I was prepared to apply the mechanical principle of the screw

and lever. For this purpose we had prepared the instrument already alluded to, and which is composed of two steel plates, about three inches in length. When applied to each other they were of a wedge shape. To the large end was attached a screw, with a broad handle, which, when turned, caused the thin extremity of the plates to expand. (See figure.) This powerful combination of the lever and screw enabled us to open the mouth completely.

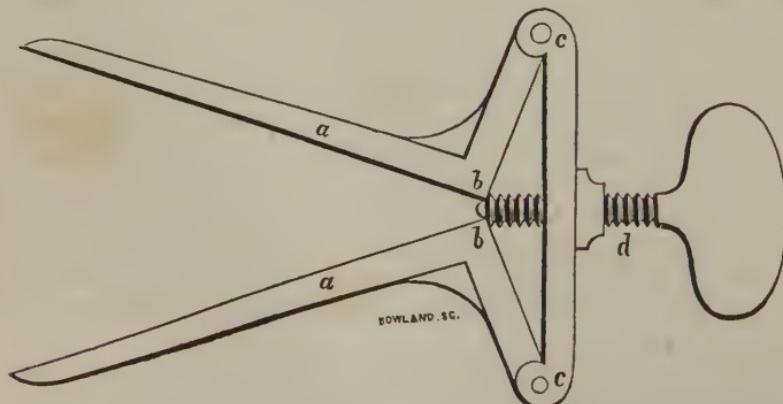
With considerable difficulty we succeeded in insinuating this *vice* between the range of teeth on the left side, being careful to have it rest along their whole course as much as possible. It was then expanded by turning the screw, and such was the report that attended the yielding of the lower jaw, that several exclaimed that the jaw was broken; but to me the noise was like the laceration of ligaments, and not such as attends the fracture of a bone. The mouth was immediately opened to a sufficient extent.

The wound of the cheek was closed with three interrupted sutures, aided with strips of adhesive plaster. From the mouth being kept constantly open for several days, by the instrument secured between the teeth, it occasioned much strain upon the stitches, and made the adhesive strips of material importance.

Either the instrument or a soft piece of wood was placed constantly between the jaws to keep the mouth sufficiently open until the cheek had healed. During this time he received his drinks and liquid nourishment from a spoon or the spout of a tea-pot. When in this way they were conveyed well towards the base of the tongue, he was enabled to swallow without much inconvenience.

As soon as the external wound in the cheek was healed, the instrument was removed, except at night, and occasionally during the day, and he was now permitted to move the lower jaw. To prevent the cheek from adhering to the jaws internally, pieces of sponge were constantly interposed. To enable the jaws to approximate, it was necessary to remove the last molar tooth of the upper and lower jaw of the left side. Several of the incisors were of the most extraordinary length, and required to be filed off, before a proper use could be made of the others.

He gradually acquired the power of closing the jaws, and was greatly delighted with the result of an operation which enabled him to chew his food, and enjoy his meals as other persons, which had



given proportion to his features, and the ability to converse and articulate distinctly. [See this case in *Am. Journ. Med. Sc.*, 1829, vol. V., p. 106.]

*Explanation of the Figure.*—*aa*, the two levers bent at right angles, and united to the fulcra *cc*, by a joint. *d*, the screw passing through the centre of the bar, and acting upon the angles *bb*, which are notched to receive its point.

CASE IV.—A merchant from Louisiana, and also the result of mercury. There was not, nor had there been, any necrosis in either jaw. When dividing the bands of adhesion with the narrow straight bistoury, the screw instrument, found so efficient in the last case, was passed between the incisores, and the mouth readily opened. The cure was perfect.

CASE V.—The fifth case was that of the young lady from Massachusetts, where I found it necessary also to procure a large patch for the whole side of the cheek, from the neck, by a geno-cheiloplastie process; previously excising all the cicatrix, and *unlocking* the jaw by the screw lever. See this case in a note under Anaplasty, in Vol. I., p. 706 of this work.

CASE VI.—This (1831) was an interesting young lady from Louisiana, about eighteen years old, who for six years had had the jaws closed. The cause was the action of mercury. The adhesions were firm on each side. They could easily be got at from within the mouth and divided, but the jaw could be opened only a little way, although a screw instrument was used on *each side* instead of in front, as in the previous cases. In order to get access, several of the teeth were filed or sawed off. All efforts, however, were ineffectual. Three different attempts were made at intervals of several weeks, and each were persevered in for some time. In no instance have I used *half* the force employed in the present case. The last attempt I made almost brought on convulsions from the pain produced, and I only wonder that the lower jaw did not break. I regret that the knowledge of myotomy we now possess, was not at that time understood; for I am persuaded, that if I had then known as much of the benefit of dividing or excising muscles and tendons, which we now have, I might have restored this interesting young lady. The subcutaneous division by a straight bistoury of the masseter muscles, would in all probability, with a moderate amount of force, have opened the mouth.—I had previously, on several occasions, divided in part this muscle, where I was obliged to lay open the cheek. All this disagreeable deformity might in her case have been avoided by the complete subcutaneous division of these muscles. I was grieved to abandon this case, the only one in which I had then, or have hitherto, failed in effecting a perfect cure.

CASE VII.—This was a young man, who when a boy eight or ten years before, had a necrosis and ulcerations from the operation of mercury. Various attempts had been made some years antecedently to open the mouth, but they all failed. I removed the adhesions freely with the probe-pointed bistoury, and with the screw-lever readily opened the mouth to its full extent.

CASE VIII.—An eighth case, (also 1831,) was a child from the District (now State) of Maine, who had had six months before,

scarlatina anginosa. Considerable ulceration took place about the cheek and gum, followed by necrosis of the upper jaw. When the ulcerations healed the jaw became closed. The necrosed portion of the bone was loose, containing several of the teeth, all of which were taken away. The screw was then applied, and the mouth opened.

CASE IX.—A little girl from South Carolina. It was the effect of salivation and necrosis. The adhesions were divided within the mouth, the instrument applied, and the jaws readily opened.

CASE X.—(Dec., 1841.) A little girl from Dutchess County, aged ten years. From the free use of calomel for a supposed inflammation of the intestines, a profuse ptyalism was the consequence. The ulcerations which took place on the inside of the cheeks were followed, on healing, with a perfect closure of the jaws, since the month of Feb., 1840. There was no necrosis of either jaw bone. After dividing the adhesions on each side freely, with a straight probe-pointed bistoury, within the mouth, I was enabled by means of my fingers to depress the lower jaw sufficiently to admit one finger. The instrument was now placed between the incisor teeth, and the mouth opened to the full extent. This case resulted in a perfect cure.

CASES XI., XII., XIII., XIV., XV., XVI.—These cases were all of a similar nature to the generality of the cases above described, and all resulted in a perfect cure by the means above employed. One of these, (1843,) I will remark was a fine boy, aged twelve years, son of Bishop W— of Maryland, whose jaws had been firmly closed for eight years. The cause was a *fall* upon his chin on the bannister of a staircase. In the fall, he was received under the chin, from which the inability to open the mouth ensued. About a year before I saw him, a *ladder in falling*, struck the anterior and upper part of the chin, which *suddenly opened his mouth*; but after a short time the rigidity returned, and the jaws were again closed. There were *no* morbid or adventitious adhesions or bands to be found. The masseter muscles on each side were remarkably small and hard. The most trifling lateral motion only was perceptible. The lower jaw was so closely shut that it was difficult to introduce a half dollar between the teeth. In this case there was the least lateral motion I ever saw, except in the young lady above, in whom alone I did not succeed by my process. This case had been given up as hopeless by all the surgeons whom he had consulted in different parts of the country; none of whom had recommended any mechanical power to overcome the difficulty. The case required a great depressing effort upon the chin, and a small lever between the teeth, to enable me to introduce the blades of the screw-lever between them. As soon as it was barely between them, the action of the screw readily made room enough to place the instrument fairly between the incisores. The mouth was then sufficiently opened. I gave him an instrument, with a request that it should be used at night between the molares teeth, while asleep, in order to keep the mouth open. After a week or two, I had made for him a small instrument on the same principle, which he used from time to time for many months, in order to continue the success of the treatment. In all the cases upon which I have operated, my plan has been, for some time after open-

ing the mouth, to use the instrument from time to time, either between the molares, or between the incisores in front; and particularly, where the instrument was not thus employed, to introduce a piece of soft wood or fine piece of cork on either side, between the molares, at night, securing it by a string around the neck. During the day I have insisted upon the practice of chewing hard crackers or hard bread, or sea-biscuit, in order to initiate the muscles into their normal functions.

It may be interesting to those who have not seen these cases, for me to state, that it is my opinion, *that where there is no lateral motion whatever perceptible*, from the action of the pterygoid muscles, then it may reasonably be inferred that ankylosis has taken place, and that but little hope can be entertained for the success of this treatment. Where there is the least lateral motion, there will then be the greatest difficulty. I may say that my *last case* occurred between two and three months since, (Nov., 1846,) in a little girl who was successfully treated by the mode above described. V. MOTT.]

New York, Feb., 1847.

FINIS.



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